



ANNUAL REPORT

1958



DEPARTMENT OF AGRICULTURE
NEW SOUTH WALES

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PARLIAMENT OF NEW SOUTH WALES

REPORT
OF THE
DEPARTMENT OF AGRICULTURE
NEW SOUTH WALES

FOR THE
Year ended 30th June, 1958

BY COMMAND

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AS AT 30th JUNE, 1958

DEPARTMENT OF AGRICULTURE*

Minister for Agriculture and Minister for Food Production	Hon. R. B. NOTT, M.L.A.
Under Secretary and Director	Dr. R. J. NOBLE.
Assistant Under Secretary	Mr. E. O. TOUT.
Assistant Director of Agriculture	Dr. H. J. HYNES.

Central Administration—

Accountant	H. J. CHARDON.
Chief Clerk.....	C. W. WEARNE.
Personnel Officer	P. S. HILL.
Pastures Protection Officer	S. W. WISE.
Legal Officer	J. L. HAGER.
Architect	H. A. BROWNE.
Biometrician	F. C. MCCLEERY.
Chief, Experiment Stations and Farms	A. PEARSON.

Division of Plant Industry—

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Deputy Chief	A. C. ORMAN.
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Principal Agronomist (Research)	Dr. S. L. MACINDOE.
Principal Agronomist (Extension)	G. NICHOLSON.

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Deputy Chief.....	H. W. EASTWOOD.
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Principal Fruit Officer (Research)	B. O. FRENCH.
Senior Inspector (Export and Import Branch).....	L. T. BILBE.

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Chairman, Board of Tick Control	J. N. HENRY.
Principal Veterinary Officer	N. K. GOLDING.
Principal Veterinary Officer (Meat Inspection).....	R. A. HALL.
Principal Livestock Officer (Sheep and Wool)	A. K. CANTRILL.
Principal Livestock Officer (Horses, Cattle and Goats)	W. J. B. MURPHY.
Principal Livestock Officer (Pigs).....	G. M. D. CARSE.
Principal Livestock Officer (Poultry)	V. H. M. BRANN.
Principal Livestock Officer (Apiculture)	A. A. CLEMSON.

Division of Dairying—

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Deputy Chief.....	VACANT
Principal Dairy Officer	J. D. I. MCGIBBON
Principal Dairy Officer (Herd Improvement)	I. W. SCOTT.

Division of Science Services—

Chief	Dr. R. J. NOBLE.
Chief Biologist	Dr. C. J. P. MAGEE.
Chief Entomologist	S. L. ALLMAN.
Chief Chemist	T. H. JOHNS.
Chief Botanist and Curator, Botanic Gardens and National Herbarium	R. H. ANDERSON.

As at 30th June 1948

Department of Agriculture—continued

Division of Information Services—

Chief	H. GARY SMITH.
Chief of Publications	S. J. K. SEXTON.
Inspector Agricultural Bureau	L. J. YALDEN.
Senior Technical Officer (Public Relations)	MISS N. W. FOSKETT.

Division of Marketing and Agricultural Commerce—

Chief	C. J. KING.
Manager (Marketing Research Office)	F. J. DUFFY.

Regional Extension Services—

Chief	J. L. JAYES.
Regional Superintendents—	
Southern Region	MR. J. BLISSON.
East Coast Region	S. S. BARNARD.
Western Region	B. D. AMENT.
South Coast and Midland	S. B. SHILLER.
South Western Region	MR. A. DICKSON.
Northern Region	S. D. TAYLOR.
Mid-Coast and Hunter Region	MR. W. CRITCHTON.
Mid-Western	F. F. NICHOLSON.

Division of Agricultural Engineering—

Principal	MR. S. SUTHERLAND.
Deputy Principal	A. JOHNSON.
Farm Supervisor	T. JONES.

Wagga Agricultural College and Experiment Station—

Principal	S. JONES.
Farm Supervisor	J. A. SHERIDAN.

Wagga Agricultural Research Institute—

Director	MR. A. T. FOSKETT.
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Experiment Farms and Stations—

Surrey Experiment Farm	Manager	J. A. BARKER.
Conjunctive Experiment Farm	Manager	MR. A. W. WOODWARD.
Owera Experiment Farm	Manager	J. M. ARTHUR.
Armidale Agricultural Research Station	Inspector	G. EDGAR.
Gosford Glass Experiment Station	Inspector (Charge)	L. F. MANDERSON.
Armidale Experiment Farm	Manager	C. E. COLLINS.
Armidale Pottery Nursery	Superintendent	A. C. CLIFTON.
Larcom Experiment Farm	Manager	C. R. HOOD.
Larcom (Glass Research Station)	Inspector (Charge)	F. S. OLDRAKE.
Murrumbidgee Experiment Farm	Manager	T. R. LAWLER.
New England Experiment Farm	Manager	E. C. POWELL.
Parramatta Experiment Station	Manager	D. C. DINGAN.
Parramatta Agricultural Experiment Station	Inspector (Charge)	J. A. LOVERIDGE.
Parramatta Experiment Farm	Manager	F. D. MCKENZIE.
Orange Agricultural Experiment Station	Manager	J. H. RALLARD.
Warrumbidgee Experiment Farm	Manager	W. J. C. HUDSON.
Yass Experiment Farm	Manager	R. J. FLYNN.

* For details of staff of the various Divisions and Branches see New South Wales Department of Agriculture brochure "Directory of Officers".

For Staff number totals see tabulation in this Report, page 18

1958

NEW SOUTH WALES

DEPARTMENT OF AGRICULTURE

Report of the Under Secretary and Director to the Minister for Agriculture and Food Production for the Year ended 30th June, 1958

Department of Agriculture,
Sydney, 18th September, 1958.

Dear Sir,

Herewith my Report for the Department of Agriculture for the year ended 30th June, 1958.

Production Trends

Rural production was considerably lower than in the previous year. This was caused by very dry weather during the first half of the year, when most of the state experienced drought conditions. The first general rain fell in January, 1958 and most districts benefited. Many continued to experience very dry conditions until towards the end of the twelve months under report. Rainfall during the second half, although generally sufficient, was not heavy enough to remove uncertainty about the early future.

At the outset of 1958, pastures were short, stock were losing condition, and water supplies had reached very low levels. Although pastoral and crop prospects have improved, landowners remain anxious about adequate water reserves for the coming summer.

Despite the long dry spell, stock losses were relatively light.

At the end of March, 1958, sheep numbers in the state were 65.8 million head; a decrease of about 1.87 million from the record figure of the previous year. However, wool cut per head was considerably lower than that of 1956-57.

Cattle numbers also declined, from 3.911 million head at the end of March, 1957, to 3.736 million in March, 1958. This decrease of 175,000 comprised 148,000 head of beef cattle and 27,000 head of dairy stock. Cattle were more seriously affected by the drought than were sheep, and pasture growth during the second half of the year was insufficient to maintain condition of large stock.

Although livestock slaughterings were higher than in 1956-57, production of beef and veal were lower. Slaughtering of sheep and lambs, and production of sheep meats, increased.

Butter production declined but output of cheese was similar to that of the previous year. Egg production also declined.

Cereal crops were severely affected. The wheat harvest of 10.6 million bushels for 1957-58 was the lowest since 1919-20 when 4.387 million bushels were stripped. Much of the wheat crop was utilised for green fodder during the dry spell, and failed to recover.

Almost complete failure of the wheat crop made it necessary to make large-scale importations of wheat into New South Wales to meet home-consumption. A total of 14.04 million bushels was imported; 12.5 million bushels from other states and 1.5 million bushels from Canada; at a cost in freight and incidental expenses, excluding the Canadian shipments, of approximately £2.75 million.

Freight costs on the wheat imports from Canada were met by the milling trade but the other costs are being recouped by a special loading applied to the local price of wheat. This loading was 4s. 0½d. per bushel from 1st December, 1957 to 17th June, 1958, and 2s. 0d. per bushel from 18th June, 1958.

The last occasion on which it was necessary to import wheat into New South Wales was in 1946-47, when, again following a disastrous harvest, 13.8 million bushels of wheat were imported.

The oat crop also was much lower; the harvest for 1957-58 being 3.9 million bushels. This was about 40 per cent. below that of the previous year.

Apart from rice, the output of all other cereal crops was considerably lower than in 1956-57. The total yield of rice reached the record figure of 106,000 tons and the yield per acre of 2.54 tons was not only an Australian but a world record.

Citrus fruit production has been lower than in 1956-57. Severe frosts at the end of 1957-58 caused considerable losses of fruit in the principal inland producing regions.

No shortage of any farm machinery occurred. Demand eased due to the uncertain seasonal conditions.

Production of Australian made steel fencing posts increased, but demand was still greater than the supply.

Bran and pollard were generally in short supply, but sufficient grain, supplemented by generally adequate supplies of high protein concentrates, was available for animal feeding. Over the second half of the year, meat meal, most important of the high protein concentrates, was in surplus supply in many areas. This was a rather rare situation.

Australian Agricultural Council and Standing Committee on Agriculture

Two meetings of the Australian Agricultural Council were held; at Adelaide in July, 1957 and at Canberra in February, 1958. Three meetings of the Standing Committee on Agriculture were held; at Adelaide in July, 1957, at Canberra in February, 1958 and again at Canberra in May, 1958.

United Nations Food and Agriculture Organisation

Dr. R. J. Noble was a member of the Australian delegation which attended the 27th Session of Council and the 9th Session of the Conference of the United Nations Food and Agriculture Organisation in Rome from 31st October to 23rd November, 1957.

The State F.A.O. Committee continued to maintain close liaison with the National F.A.O. Committee and, through that Committee, with the headquarters of the United Nations Food and Agriculture Organisation in Rome.

The State F.A.O. Committee and the Department continued to support F.A.O.'s Expanded Programme of Technical Assistance to under-developed countries. Several Departmental and former officers were active in the programme. The Department also assisted in training agricultural students and government officers from various Asian countries.

Farrer Memorial Trust

The Trustees of the Farrer Memorial Research Scholarship Fund held an Annual and an Ordinary Meeting.

The 1957 Farrer Memorial Oration was delivered by Mr. J. G. Crawford, C.B.E., M.Ec., Secretary of the Commonwealth Department of Trade.

The Oration was delivered on 9th July, 1957 at the Annual State Congress of the Agricultural Bureau of New South Wales at Hawkesbury Agricultural College. Mr. Crawford was presented with the 1957 Farrer Memorial Medal on behalf of the Trustees in recognition of his distinguished service in agricultural science.

Subject of the Oration was "Economics—The Nation and the Individual", and the text was subsequently published in the *Agricultural Gazette of N.S.W.*

Farrer Memorial Trust Scholar, W. V. Single, completed his studies in the United Kingdom and returned to Australia in December, 1957. His work on manganese mobility in wheat was presented as a thesis to the London University and to the Imperial College of Science and Technology in part fulfilment of the requirements for the Degree of Doctor of Philosophy and the Diploma of Membership of the Imperial College, respectively. These honours were conferred on Dr. Single shortly before he left England.

Dr. Single has resumed work with the Department at the Agricultural Research Institute, Wagga.

Botanic Gardens and Sydney Domain Trust

Five meetings of the Trustees of the Botanic Gardens and Sydney Domain were held.

Discussions included current proposals for the Eastern Distributor Expressway through the Botanic Gardens and the Domain; provision of car parking facilities in the Domain; establishment of an annexe to the Botanic Gardens; restoration of an area in the Domain adjacent to the Registrar-General's Department; and representations from sporting bodies for the establishment of bowling greens above the Car Parking Station in the Domain.

The Hon. R. B. Nott, M.L.A., Minister for Agriculture and Minister for Food Production, was appointed a Trustee *vice* the Hon. E. H. Graham, M.L.A., deceased.

McGarvie Smith Institute

A large range of vaccines was produced at the McGarvie Smith Institute; and was sold throughout Australia and in a number of countries overseas.

In accordance with the McGarvie Smith Institute Incorporation Act, 1928, profits from the sale of vaccines are applied to the promotion and advancement of veterinary education and research. Financial position of the Institute is satisfactory.

Agricultural Education

Total student enrolment at Hawkesbury Agricultural College was 236 at the beginning of the first session in February, 1958; and 94 at Wagga Agricultural College. Demand for enrolment at both Colleges continues to be heavy.

Short-term schools at Hawkesbury and Wagga Agricultural Colleges were again numerous. They comprised Dairy Farming, Poultry Farming, Pig Raising, Youth Leadership, Tractor Maintenance, Junior Farmer, Beekeeping, Turkey Raising and Pasture and Animal Husbandry Schools.

Courses were provided also for dairy factory apprentices, and University of Sydney 2nd Year Agriculture students.

The two Agricultural Colleges are reported in detail in a later section respectively of this report.

Office and Laboratory Accommodation

Following the departure of units of the Department of Conservation, Water Conservation and Irrigation Commission, and Conservation Authority of N.S.W., from the head office building, the Public Service Board approved of the Department using most of the vacated space for its own office. This has relieved the overcrowded conditions which have long prevailed in some Divisions and Branches.

It has been proposed that the Chemist's Branch, Biological Branch, Entomological Branch and the Seed Testing Laboratory be transferred to a site at Rydalmere. This will involve the erection of a new building. Preliminary planning in respect of this new accommodation is proceeding in anticipation of funds being available.

Expenditure—Summary

Payments from Consolidated Revenue Fund relating to investigational, education and associated administrative activities totalled £2,182,766. Receipts from sales of farm produce, fees and other miscellaneous revenue, totalling £570,589, reduced the net cost of these services to £1,612,177.

Cattle tick eradication and control cost £1,105,443 (net) after allowing for stock dipping fees and other minor items of revenue totalling £7,167. The Commonwealth Government has contributed £535,874 towards the campaign costs, leaving £569,569 to be borne by New South Wales.

The Botanic Gardens and allied activities accounted for further sum of £125,493, offset by receipts totalling £10,900 leaving a net cost of £114,489 to the Consolidated Revenue Fund.

Buildings and improvements of a permanent nature to a total cost of £75,456 were constructed. This was provided by the Treasury from Loan funds.

Details of the Accounts of the Department, including numerous Special Deposits Accounts, opened with the Treasury in terms of the Special Deposits Account Act of 1911, are presented in the Appendix I.

Capital Works

The Department has in hand for completion in 1958-59 capital works such as buildings, water supply, stock yards, etc. estimated to cost £90,000.

In addition to the works in hand, many improvements are essential at the Experiment Farms and Stations by way of buildings, water supply, fencing, etc.; and at the Agricultural Colleges; in the interests of the research and education needed for the well-being and development of the rural industries.

Bush Fire and Flood Relief

As agent for the Bush Fire and Flood Relief Committee this Department paid claims totalling £13,804 to flood victims who suffered losses in the 1956 floods.

Bush Fire claims totalling £37,290, arising from the disastrous fires which occurred in 1957-58, were also paid.

Country Killing

The initial programme for erection of four large-scale Abattoirs at country centres, to cater for the metropolitan and export markets as well as for the respective country area, has been completed.

Gunnedah Abattoir was officially opened by the late Minister for Agriculture and Minister for Food Production on 17th July, 1957.

Goulburn Abattoir commenced operations in May, 1951, Wagga Abattoir in December, 1951, and Dubbo Abattoir in August, 1954. All have proved successful, in terms of numbers of stock slaughtered and financially.

Meat Inspection

Increased meat inspection staff have made possible a more effective service. At Homebush Bay it is no longer necessary to rely upon the uncertain availability of assistance from Commonwealth meat inspectors.

Stock slaughtered and inspected for consumption within the metropolitan area have substantially increased. The increase was most marked at the country abattoirs.

Opening of a new meat market at Homebush for country killed meat has enabled the use of Darling Harbour railway goods yard as a meat distributing re-inspection depot to be discontinued. Meat consigned to Sydney for local consumption, other than that consigned in refrigerated road transport, which may be delivered direct to retail shops, is now forwarded to the Homebush Bay Meat Market or to one of the privately owned licensed meat markets in the metropolitan area.

The hygiene of meat handling and meat transport have continued to improve and the position is now generally satisfactory. Inspections to ensure that no unfit meat is passed for human consumption have continued at all abattoirs. There have been general improvement in hygiene and inspection facilities, particularly at licensed abattoirs within the metropolitan abattoirs area.

Swine and Cattle Compensation Funds

Claims against the Swine Compensation Fund have shown a marked reduction in recent months. Consequently the levy imposed by way of Stamp Duty has been reduced from 2s. to 1s. per head as from 1st May, 1958, on all pigs delivered for slaughter.

On the other hand, claims against the Cattle Compensation Fund have markedly increased. This is a direct result of an accelerated campaign to eradicate certain specified diseases.

In order that claims could be met the rate levied by Pastures Protection Boards under the Cattle Compensation Act was increased to 1s. 6d. per head as from 8th January, 1958; and the Stamp Duty levied under the Cattle Compensation (Taxation) Act was increased to that amount as from 1st May, 1958.

The amount levied for Swine and Cattle Compensation is kept under close scrutiny by the Department, so that the charge on the industry may be reduced as soon as the level of compensation claims shows signs of permanent reduction.

Cattle Tick Eradication Campaign

Kyogle Area and Areas west of the Richmond Range underwent their inspection period as a part of the eradication programme. From July to September, 1957, odd infestations were found in the Kyogle Area; but from November, 1957 to February, 1958, ticks were found widespread throughout this Area.

Eventually some 50 per cent. of the holdings were found tick-infested. In the Areas west of the Richmond Range ticks were found on properties from December, 1957 onwards; and, in all 75 properties were found infested.

In view of the failure to eradicate the tick it was necessary for Kyogle, Woodenbong, Bonalbo and Northern Tabulam Areas to revert to a control policy.

Cattle tick has not been detected in the Rivertree, Bookookoorara and Cullendore areas. Consequently the eradication programme is continuing in these three sections.

Two tick infestations in Southern Tabulam and a single infestation in the Cheviot Area were found. It was possible to arrange for the eradication measures to continue in these sections.

The remaining Area, Boonoo Boonoo, is still undergoing the eradication programme.

It is disturbing to record that cattle tick spread to previously clean country, in the Copmanhurst and Grafton Areas. One infestation was found in Copmanhurst, and twelve were recorded in the Grafton Area. It has been necessary to re-declare the Copmanhurst and Grafton Tick Quarantine Areas. They comprise an area of some 3,000 square miles. Immediate attention has been given to recommissioning dips in these two areas, to deal with the infested herds and to treat stock moving to clean country.

Animal Diseases—Developments of Note

Vibriosis in sheep was diagnosed in New South Wales for the first time.

Tuberculin testing has markedly increased.

A severe outbreak of tuberculosis in cattle at Peak Hill is believed to have been caused by the human T.B. strain.

Sheep blowflies have developed resistance to Aldrin and Dieldrin.

"Winter dysentery" occurred in cattle for the first time.

Each of the foregoing developments is subject of more detail in the Division of Animal Industry section of this report of the Department.

Poultry Improvement Plan

Inauguration of the New South Wales Poultry Improvement Plan and the Random Sample Tests at Hawkesbury Agricultural College have created throughout the poultry industry keen interest and recognition of the need of breeding, improvement work.

The nutrition research activities of the Poultry Experiment Station also are being keenly followed by commercial egg producers.

Stringent economic conditions in the industry have started an era from which much greater efficiency can be expected.

Livestock Successes at 1958 R.A.S. Show

The Department's livestock achieved considerable success at the 1958 R.A.S. Show. Awards included more than half of those offered in the Arab Horse and the Stud Goat sections. An Arab stallion bred by the Department won the Supreme Championship, Champion and Reserve Champion Arab stallion awards. Reserve Champion Arab mare award also was gained for the Departmental Stud.

In the Saanen goat section the Champion Doe award, and the award for the buck whose progeny gained the highest number of points in the show ring, were won by the Department's Condobolin Experiment Farm Stud.

Aberdeen Angus and Poll Shorthorn beef cattle exhibited respectively from Trangie Agricultural Experiment Station and Wagga Agricultural College were not so successful as in some previous years but drew favourable comment and sold quite well. Two prizes were won by these cattle.

In the Dairy Cattle Section the Department was represented by exhibits from its Friesian, Jersey, Australian Illawarra Shorthorn, and Guernsey Studs. In general they were probably the most successful ever to represent the Department in a Dairy Cattle Section.

Outstanding performances were those of two bulls purchased overseas by the 1955 Stud Stock Buying Delegation led by the late Minister, the Hon. E. H. Graham. The Friesian Sire, "Sniders Fond Hope King" (imp. Canada) and the Guernsey Sire, "Champion of Friquet de Haut" (imp.), were awarded the Senior Male Championship in the respective sections, for the second successive year.

In the Production Competitions several major awards were obtained.

Wheat Industry Research

Research Fund.—Wheat growers, by voluntarily agreeing to a levy to establish a fund to speed up wheat research, have made a major contribution to the welfare of their industry. A Wheat Industry Research Council and State Wheat Industry Research Committees have been set up to handle distribution of the funds. Some of the available money has now been allocated.

First grants approved by the Wheat Industry Research Committee of New South Wales totalled £19,000. The Department's Agricultural Research Institute, Wagga, has been allotted £9,250.

Winter Wheat, Winglen.—The new winter wheat variety Winglen has entered the first stages of commercial production. This is an important development. Winglen has given excellent results in the field and has marked advantages over the only other winter wheat at present grown commercially.

Durum Wheat, Dural.—A new durum wheat variety entered commercial production in north-western New South Wales, as a result of the northern breeding programme. This variety, Dural, emerged from tests as a most desirable variety for the production of quality spaghetti and macaroni semolinas. It also has given in suitable north-western soils a field performance comparable with some of the current bread wheat varieties.

Quality Wheat Trend

A significant change in the wheat variety acreage position occurred. The New South Wales bred Gabo, a good quality variety, superseded the weak quality variety Bencubbin from the leading position occupied by the latter for the previous seventeen years; and also became the leading variety in Australia. This is the first year in which a medium-strong variety has occupied the leading position in Australia.

Pasture Insect Pests

Pasture insects were of increasing importance. The Amnemus weevil on the north coast and the black soil scarab in the north-west were particularly troublesome. Unless satisfactory control measures are developed, these insects will seriously retard the expansion of sown pastures in the affected areas. Entomologists are concentrating attention on them.



Filling Clamp Silo, Hunter River District

Farmer interest in fodder conservation in the past has tended to fade under favourable seasonal conditions. Interest in silage has increased of late. This is attributed to better machinery for the harvest, the making, and the feeding out of feed as silage.

(Photo. from Maitland office)

Fodder Conservation

In the succession of favourable seasons stock numbers have built up to record figures but increase in fodder conservation has not been in proportion.

The drought of 1957 focused farmers' and pastoralists' attention on inadequate supplies of conserved fodder. Because of the carry-over of dry feed, and the low rabbit population, direct stock losses were relatively light, but indirect losses through restricted breeding, reduced returns from wool, lower dairy production, and less fat stock were considerable.

That the State met the impact of drought as well as it did was due to the increased areas of improved pastures, the low rabbit population, subdivision and improved management of grazing areas, expansion of public and individual farm irrigation systems, improvement in stock water supplies and transport facilities, improving stock management, and more efficient utilisation of fodder supplies than hitherto.

For many years the Department has endeavoured to encourage farmers to store more fodder, as part of their farm management plan. Progress is slow but the pattern is changing. Encouraged by modern farm mechanisation, there is a perceptible increase in awareness of the need to make provision to supplement pasture and feed crops by conservation for periods of scarcity.

There has been a substantial increase in conservation of pasture hay, and conservation of grain has received greater attention; much of it is stored in galvanised iron or steel silos. Grain bulk-handling methods have helped to popularise the latter.

No form of fodder conservation has received more publicity than silage over the years. Its virtues have frequently been stressed, and yet at no time have reserves reached commendable proportions. One of the bigger problems in making and feeding-out silage has been the manual labour required. Recent developments in mechanisation and advances in feeding-out techniques have increased farmers' interest in silage. Another interest-awakening development is the use of polythene sheets as an airtight seal, for which the test results have been favourable.

Weed Control Developments

Research in Serrated Tussock control, based on Bathurst Experiment Farm, produced very promising leads for treatment of Tussock on non-arable land. The principles include

aerial sowing of clovers, judicious use of fire, and of herbicides and good management. As a result of the lead given by research, Upper Macquarie County Council subsidised aerial sowing of several hundred acres of non-arable lands infested with Serrated Tussock.

A new hormone-type weedkiller, 2,4-DB (2,4-Dichlorophenoxybutyric acid) has been tested in many areas. Proving of particular value in control of broadleaved weeds, lucerne and clovers. Weeds have been a major problem in the establishment of lucerne, particularly on river flats, and often in the establishment of irrigated pastures.

Tobacco Blue Mould Resistance

Ironically, the tobacco disease of world-wide importance and most difficult to control, Blue Mould (*Peronospora tabacina*) was first recorded in this country where tobacco farming has been relatively minor. Accordingly, it is of particular interest that work by this Department is now being done with promise for control of this disease.

At Bathurst Experiment Farm in 1957-58 representatives of the tobacco processing industry were deeply impressed by the Department's Blue Mould resistant lines. They have indicated their eagerness to co-operate, and to arrange field trials with particular commercial growers.

Linseed Research

Interest in linseed growing has shown signs of increasing. Enquiries have been received not only from the north-west where it has previously been popular in certain areas, but also from the central west and south-west. The fall in world prices has undoubtedly contributed to the trend.

Despite lack of farmer interest in linseed for the past five or six years, the Department continued its research and experiments. If the current interest develops into active adoption of the crop, improved varieties will be available as an outcome of the Department's persistence.

In 1957-58, linseed plant breeding was conducted at Bathurst Agricultural Experiment Station, and advanced breeding material, demonstration plots, and farmers' variety trials were sited on three north-western farms. The Department's cross-bred material is very promising. Lines with an apparent high resistance to Pasm, a devastating disease of linseed under Australian conditions, are in hand.

Rice Industry; Sod-Seeding Development

The rice industry of this State is an outstanding example of the advantages of mechanisation and sound agricultural principles. Rice production was a record, of 106,000 tons, with a world record per acre average of 2.54 tons.

A practice that may revolutionise the economy of the rice industry has been pioneered by the Department. This is the application of the sod-seeding principle, already established for pasture improvement, to the sowing of rice. The seed is sown with a sod-seeding machine adapted to sow in 7-in. spaced rows in an established irrigated pasture. Although as yet only experimental, the results have been most encouraging.

Cotton

Waters of Keepit Dam will be available for farming purposes within the next five years, and the Department is now making exploratory studies on crops for irrigation farming under north-western conditions. The potential of cotton has been examined and the study will be extended. Intensive experiments on this crop will proceed at the newly established Narrabri Experiment Farm.

Changing Pattern in the Vegetable Industry

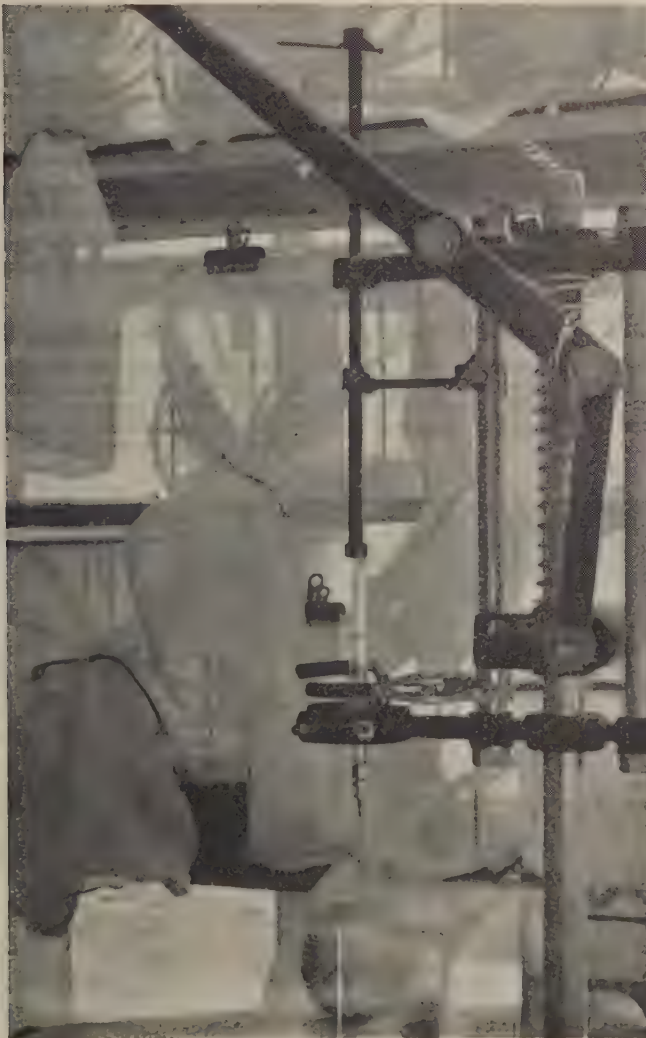
Social and economic circumstances are changing the pattern of vegetable production. One of the most marked effects is displacement of the metropolitan market gardener. Steep

increases in land values, the high cost of water, and difficulty in procuring animal manure, have combined to make production uneconomic for many in the near-metropolitan area. Many have subdivided their gardens for housing or industrial blocks. Some have moved farther from the city to continue vegetable growing. Others have left the industry.

Another factor has been the subdivision of land close to the city into farmlets of 3 to 10 acres. Purchasers, often New Australians, in many cases have undertaken vegetable production in addition to normal work elsewhere, to pay for the farmlet. These part-time growers have to an extent replaced the former full-time metropolitan market gardener, but their indiscriminate production and marketing have been critical factors in the frequent long periods of gluts and low prices in the vegetable markets.

Vegetable Pre-packaging

A further development in the vegetable industry is in relation to packaging and pre-packaging. The opening of self-service marketing centres in the city and suburbs has increased the demand for ready packed vegetables. Pre-packaging of vegetables poses problems but it appears that they can be met and that increasing quantities of pre-packaged vegetables will be marketed.



Fruit Fly "Egg-laying" Machine and Breeding "Cages" at the Citrus Wastage Laboratory, Gosford

The machine deposits fruit fly eggs in citrus fruit, for experiments in fumigation treatment of "stung" fruit. The concentration of residual Ethylene di bromide within the fruit sufficient to kill 100 per cent. of the egg-hatch has been determined.

(Photo. from Gosford Office)

Training in Irrigation Farming

The marked increase in irrigation throughout the State in recent years and particularly in 1957-58 has made it necessary that all field officers shall consolidate and increase their knowledge of irrigation. This year a special, intensive school for district agronomists and fruit officers was promoted at Yanco Experiment Farm. Further similar schools will be conducted, until all field officers have participated.

The Department has been actively associated with the Water Conservation and Irrigation Commission in the investigation of areas to be developed for irrigation in the Murrumbidgee, Namoi and Macquarie River valleys.

Fruit Fly

For the citrus industry, outbreaks of fruit fly at Narrandera and Dareton had serious effects, New Zealand will not accept fruits grown within 50 miles of a point where fruit fly has been found in the preceding twelve months. Consequently, the growers in the Murrumbidgee Irrigation Areas and Lower Murray districts lost this season's citrus export trade to New Zealand. Since the Dareton outbreak also affects Victoria, the New Zealand market this year would be met by South Australian growers.

Moreover, because of the Dareton outbreak, Victoria imposed restrictions on all Coomealla fruit; and demanded inspection of all citrus fruits prior to marketing in Victoria. An amount of £2,500 has been made available to employ inspectors in this work.

In the Narrandera district the fly was first detected in January, 1958, and eradication actions commenced immediately. The infestation was fairly widespread in the town; 48 centres of infestation in an area comprising some 500 allotments. The eradication actions are thought to have been completely successful.

In the Dareton district the fly was detected in a few apples in April, 1958. Eradication actions commenced immediately. They included removal of all deciduous fruits from the trees, and spraying and baiting to an approximate distance of one mile from the two infested points. Mildura District Citrus Co-operative Association donated £250 for purchase of materials, and supplied spray outfits and personnel to spray all backyards in Dareton.

Regional Extension Services—Agricultural Regions

The first Region, Southern, with headquarters at Wagga, was established on 3rd February, 1953. The original programme foreshadowed ten Regions, each containing about 7,000 primary producers, in the Eastern and Central Divisions of the State.

Seven Regions were established in the period February 1953, to June, 1957.

On 31st October, 1957, the eighth Region, Mid-Western with headquarters at Cowra, commenced operations.

North-Western, including Moree, Walgett, Narrabri, Coonabarabran, Gunnedah, and Quirindi, will be inaugurated before the end of 1958. This will be the ninth and final Region in the programme.

Areas adjacent to Sydney which were to comprise the tenth Region will remain outside the system. They will be served from the head office of the Department.

Co-ordinated Extension Services

The Co-ordinated Extension Services scheme formally assures close co-operation in the field, between Department of Agriculture officers, Soil Conservation Service officers, Rural Bank country valuers, and New South Wales Milk Board field supervisors.

Officers of the four co-operating organisations collaborate for effective application of their combined resources in agricultural advisory services.

Agricultural Extension Grant

The Commonwealth Government decided to continue the Grant made to the States to further agricultural extension services. An amount of £250,000 will be made available each year until 30th June, 1960. New South Wales is allocated £62,500 per annum.

The funds have been used in promoting pasture, crop, and livestock demonstrations on farms; for provision of extension aids for the advisory services, aids in the form of equipment and field assistants; and for university and agricultural college trainees who are potential recruits to the Department's services.

The many projects receive notice in the reports of the various Divisions of the Department.

A specific section of the report (page 103) provides more details of the Agricultural Extension Grant projects.

Dairy Industry Extension Grant

The Grant made by the Commonwealth to the States to be expended on extension services in the dairying industry, was due to terminate on 30th June, 1958, but the Commonwealth has determined that the Grant will continue until 1963. New South Wales receives £64,880 per annum.



Dairy farmers foregather in the field to discuss the outcome of local "Milking Machine Efficiency Surveys" conducted by a dairy research officer and field officers

(Photo. from Lismore Office)

funds of the Dairy Industry Extension Grant are used largely towards increased efficiency in the dairying industry. A later section of this report (page 103) provides more detail of the Dairy Industry Extension Grant projects.

Legal and Registration Branch

ACTS PASSED

Wheat Industry Stabilization (Amendment) Act, 1957.—The drought resulted in almost the complete failure of the State wheat crop and it became necessary for the Australian Wheat Board to import wheat from other States and from overseas in 1957-58 to meet the State's needs.

This Act authorised the Wheat Board to load the price of wheat for the period, to the extent necessary to meet additional costs involved in the importation and internal distribution of wheat.

Dried Fruits (Amendment) Act, 1957.—The Dried Fruits Board was given direct control of the funds collected from licensed packing houses for the administration of the Act. Power was conferred upon the Board of investing surplus funds in approved trustee securities.

Pastures Protection (Amendment) Act, 1957.—The main purpose of this Act was to provide for the appointment of officers by Pastures Protection Boards, and to transfer powers, under the Pastures Protection Act in respect of the administration of travelling stock reserves, from veterinary inspectors to the rangers.

The Act also contained a number of machinery amendments to the Principal Act, for the better administration of the Act under the Pastures Protection Boards.

Swine Compensation Taxation Act, 1958, and Swine Compensation (Amendment) Act, 1958.—The Compensation Taxation Act, 1958, reduced the duty payable by owners of pigs delivered to an abattoir for slaughter from 2s. 0d. per pig to 1s. 0d. per pig. The reduction was made because of a substantial accumulation of moneys in the Fund from which compensation is paid for pigs ordered to be destroyed and cases condemned on account of prescribed diseases.

The Compensation (Amendment) Act, 1958, made amendments to the Principal Act consequential upon the variation of the rate of duty.

Cattle Compensation Taxation Act, 1958.—This Act increased the duty payable by owners of cattle delivered to an abattoir for slaughter from 1s. 0d. per head to 1s. 6d. per head. The duty provides for the Cattle Compensation Fund a supplementary source of revenue to that provided by the general rate levied on the ownership of cattle, and the increase of the duty corresponds with an increase already made in the general rate.

The increase has been made necessary by reason of greater expenditure upon the Fund, as a result of a step-up in herd testing for tuberculosis.

Regulations, Proclamations

There were thirteen gazettals of regulations, forty-eight proclamations and 100 notifications during the year.

Regulations were gazetted which:—

- (i) limited the responsibility of the Meat Board for meat placed or left in the Meat Hall at Homebush Abattoir;
- (ii) authorised farm produce agents to deduct $\frac{1}{4}$ d. per cask of apples and pears sold by them, to provide a fund to advertise these products.

A Proclamation was gazetted in pursuance of the Border Railways (Grain Elevators) Amendment Act, 1957; approving the erection and operation by the Victorian Grain Elevators Board of elevators along the Border Railways.

Prosecutions

For offences under the various Acts administered by the Department 196 persons were prosecuted.

Arbitration—Agricultural Holdings Act, 1941

Five new disputes were referred to arbitration under the Act. Four were for improvements and in the other case a landlord asked the Agricultural Committee to find that his tenant was not cultivating his holding according to the rules of good husbandry.

An Agricultural Committee also met on two occasions in a dispute previously referred to arbitration.

In two cases the Agricultural Committee sought the opinion of the district court on a question of law.

Registrations

Registrations effected during 1957-58 and those of 1956-57 are compared below:—

	1956-57	1957-58
Apiary registration	3,756	3,666
Potato licences	1,595	1,617
Stock foods	920	1,063
Stock medicines	1,494	1,550
Pest destroyers	1,039	1,385
Sheep brands	2,387	2,000
Sheep earmarks	2,635	2,157
Large stock brands	2,039	1,574
Fertilizers	455	487
Farm produce agents	297	306
Veterinary surgeons	385	412
Swine brands	1,946	1,354
Swine licences	73	60

Veterinary Surgeons Board

In view of the vacant position of Registrar, the Board met on only eight occasions.

The prescribed examination for veterinary graduates of overseas universities was held in September, 1957. One candidate was successful.

Personnel Branch

Attention was given to induction by arranging reception, adjustment and basic instruction of new employees.

The special brochure which is issued to newly appointed members of the staff is under revision.

Sections of the "Manual of General Information for Officers" were also revised and forwarded to the Government Printer.

Tutorial assistance was organised for clerical officers preparing for grade examinations. The Personnel Officer also arranged the setting and marking of essay assignments for field officers to satisfy examination obligations under Public Service Regulation 124. Liaison was also maintained with the Examinations Branch of the Public Service Board with regard to grade examination papers for officers and employees required to take "in-service" examinations.

Many members of the staff sought Personnel Branch advice on educational matters, career prospects, adjustment problems within and outside the Department, and other matters. In appropriate cases the Counselling Services of the Public Service Board Office and the Health Department were called upon.

The Matron and First-aid Officer provided services as required. No serious casualty was reported, but 447 minor cases (female, 195; males, 252) received attention.

Staff working conditions and amenities received attention.

At the commencement of the 1958 academic year, twenty new trainees and cadets were appointed. These comprised 9 trainees in Veterinary Science; 6 trainees in Agricultural Science; 1 trainee in Rural Science; 4 Agriculture College Cadets.

At the end of the 1957 academic year 24 trainees and cadets successfully completed their University and/or Agricultural College training. With the exception of a cadet who resigned, all were appointed to the staff in January, 1958, to fill vacant positions.

As at 30th June, 1958, the Department had a total of 64 trainees and cadets at the Universities and Agricultural Colleges, not including five whose traineeships were under suspension at that date.

A further series of lectures and discussions on staff supervision was provided for a group of Departmental supervising officers. Lectures were given by Public Service Board and Sydney Technical College staff. Officers commented favourably on benefits derived from this course.

A steady flow of Asian and other overseas students continued, and Personnel Branch maintained close liaison with the Commonwealth Public Service Board in arranging programmes and training facilities. These students came to Australia under the auspices of the Colombo Plan, F.A.O. and U.N.E.S.C.O. Officers throughout the Department co-operated to ensure that the students made best possible use of their time in this State.

Staff

Appointments.—H. J. Chardon, Accountant; B. O. French, Principal Fruit Officer; N. S. Shirlow, Special Agronomist; T. E. Kitamura, Special Agronomist; R. W. Newlands, Veterinary Officer; M. Lindtner, Veterinary Officer; T. V. Bourke, Entomologist; R. L. Colman, Analyst; J. A. Atkinson, Plant Inspector; E. J. Craze, Plant Inspector; B. O. E. Calder, Dairy Officer; J. M. Colless, Agronomist; G. Almgren, Cereal Technician; R. V. Wilson, Port Inspector; R. A. Pearce, Economics Research Officer; A. J. Morrant, Biologist; C. W. Langby, Livestock Officer; L. R. Kavanagh, Assistant Principal Agronomist; W. A. Barr, Lecturer; R. G. Alford, Biometrician; F. J. Nicholson, Regional Supervisor, Cowra; L. J. Green, Chief, Regional Extension Services.

Retirements.—F. L. Hedges, Accountant; G. McGillivray, Chief Division of Dairying; L. Jones, Cereal Technician; W. T. Flanagan, Inspector, Plant Diseases Act; R. J. Job, Inspector, Plant Diseases Act; E. P. Foster, Inspector, Plant Diseases Act; S. R. Morrison, Garden Labourer; Miss B. E. Rees, Clerk.

Departed for Overseas.—Mr. D. M. Munns, Analyst, to take up an Assistantship at the University of California and under a Thomas Lawrence Pawlett scholarship; Mr. J. T. Moraghan, Agronomist, to study Plant Nutrition problems in the U.S.A. under an Assistantship at the Iowa State College; Mr. J. Piotrowski, Gardener, 1st Class, for U.S.A. and Europe, for study of horticultural developments; Miss N. M. Foskett, Senior Extension Officer (Women's Service), to attend a special course in "Developing Leadership for Home Economics Programmes" and to attend the Ninth International Congress of Home Economics in the U.S.A.; Mr. G. J. Shanahan, Entomologist, during a private visit to the U.S.A. and the United Kingdom to devote certain time to official duties associated with insecticide resistance and ectoparasite control; Mr. G. J. F. F. Smith, Dairy Officer (Research) to the U.S.A. to accept an Assistantship at the University of California; Mr. P. C. Druce, Principal Economics Research Officer, to the United Kingdom to investigate research and extension developments in agricultural economics for four weeks during a private visit; Dr. A. T. Pugsley, Director, Agriculture Research Institute, to attend the First International Wheat Genetic Symposium and the 10th International Congress on Genetics, Canada, and also to visit the U.S.A.

Returned from Overseas.—Mr. G. C. McFarlane, Economics Research Officer, from University of Bristol, England, where he held an appointment as Assistant Agricultural Economist; Mr. L. T. Bilbe, Senior Inspector, Export and Import Branch, from the United Kingdom where he had been assisting the Commonwealth Fruit Officer; Mr. R. R. Storrier, Analyst, from Rothamsted, England, where he had been as a Thomas Lawrence Pawlett Scholar; Dr. B. P. Setchell, Veterinary Officer, from the United Kingdom, as a Walter and Eliza Hall Scholar; Dr. W. V. Single, Senior Research Officer, from the Imperial College of Science and Technology, England, as a Farrer Memorial Scholar; Mr. R. Layland, Laboratory Assistant, from a period with the Government of North Borneo under the Colombo Plan; Dr. B. G. Davey, Analyst, from the University of Aberdeen, Scotland, as a Thomas Lawrence Pawlett Scholar.

Visited Overseas During the Year.—Dr. R. J. Noble, Under Secretary and Director, attended the United Nations F.A.O. Conference at Rome, and subsequently made brief visits to Switzerland, France, Holland, Denmark and England for discussions on agricultural organisation; Mr. H. Parry Brown, Chief of the Division of Information Services, attended the International Seminar on "Methods and Programming in Agricultural Extension Services" in The Netherlands, and visited other European countries, the United Kingdom and the U.S.A. to further his studies in rural extension methods; Dr. L. Fraser, Plant Pathologist, visited the U.S.A. to investigate Pierce's Disease in grapevines; Mr. H. W. Leo, Agronomist, visited the U.S.A. for research into tobacco disease and production problems; Mr. J. M. Holder, Veterinary Officer, visited New Zealand to further his knowledge in nutrition research.

Numbers of Staff at 30th June, 1958

	Public Service Board	Ministerial	Total
Central Administration	292	...	292
Division of Information Services	42	...	42
Division of Marketing and Agricultural Economics.....	30	...	30
Division of Science Services ...	100	...	100
Division of Plant Industry	186	...	186
Division of Dairying	167	...	167
Division of Horticulture	127	...	127
Division of Animal Industry—			
Head and District Offices	185	12	197
Meat Inspection Service ...	137	14	151
Queensland Border	42	...	42
Tick Quarantine Areas	37	716	753
Hawkesbury Agricultural College	51	64	115
Wagga Agricultural College	25	47	72
Experiment Farms and Nurseries	141	171	312
Botanic Gardens.....	118	3	121
	1,680	1,027	2,707

Architect's Branch

Loan Funds and Consolidated Revenue Funds expended on new works and maintenance work were as follows:—

	£
Loan Funds	75,456
C.R. Funds	71,198

Work completed.—This comprised a sewage treatment plant and kerbing, guttering and road sealing around the main buildings at Wagga Agricultural College and Experiment Station; town water supply for Condobolin Experiment Farm; a machinery shed at Gosford Citrus Experiment Station; two hay sheds at Leeton Experiment Farm; a tobacco research laboratory at New England Experiment Farm; and an experimental sheep house at Trangie Agricultural Experiment Station.

Work Still Proceeding.—This includes the dairy products factory at Hawkesbury Agricultural College; a new administration building, stewards and officers' quarters, etc., new dairy buildings and yards and a cottage at Wagga Agricultural College and Experiment Station; a cottage and a hay shed at Cowra Experiment Farm; the establishment of an Irrigation Experiment Farm at Narrabri; the plant breeders' shed, office and laboratory, town water supply and a cottage for the Manager at Tamworth Agricultural Experiment Station; and water supply to cottages at Wollongbar Experiment Farm.

Maintenance Work.—This consisted of painting and repairs to cottages and farm buildings at Yanco, Bathurst, Cowra, Grafton, New England and Wollongbar Experiment Farms; also at Gosford Citrus Experiment Station, Glenfield Veterinary Research Station, and the Queensland border; and the desilting of tanks and maintenance and replacement of equipment on Public Watering Places in the Western Division.

Extension Service.—Many enquiries concerning building problems were attended to by letter or personal interview, and plans representing farm buildings to the estimated value of £165,450 were supplied to farmers.

Pastures Protection Section

Grasshopper Control.—Outbreaks of plague locust were few and minor. Measures taken by the local Pastures Protection Boards and landholders were sufficient to deal with them.

A refresher course was conducted in Sydney for Rangers from all Districts affected by the plague locust. The Rangers were instructed in the latest developments in insecticides and spraying equipment, and in control organisation. A day was devoted to demonstrations, at Glenfield Veterinary Research Station, of the various types of spray equipment available for use by Pastures Protection Boards and landholders.

Australian Plague Locust, Trial Control Campaign.—Organisation has proceeded for the control trial in the Bogan-Macquarie Outbreak area; a control strategy of this kind has been termed "outbreak suppression".

Last year's report recorded further detail and background of the undertaking.

Twenty Micron Sprayers have been imported from England at a cost of £6,137. Ten of them are stored at the Trangie Experiment Station and ten at Dubbo. These machines will be used in the Trial Campaign.

One of the principal developments this year has been the proposal to use Bush Fire Brigades in the Control Campaign. The Pastures Protection Field Officer made an extensive tour of the campaign area in April and May, 1958, and made contact with most of the Bush Fire Brigade Captains and their officers. Members of the Brigades will supply utility trucks with a driver and an operator to take part in the Campaign. The Micron Sprayers will be mounted on these trucks. An advantage from this arrangement is that the drivers of the trucks will know, in considerable detail, the areas in which they will be operating.

Rabbits.—The rabbit population throughout the central and northern parts of the State is reported to be lower than for some time past; possibly as low as at any time during this century. In the south-west, rabbit numbers are higher.

In April, 1958, all Pastures Protection Boards were asked for a detailed report on rabbit infestation as at 31st May. Whilst some of the reports were not very informative, overall they showed that rabbit numbers are at present very low and under control.

The Boards have also been requested to submit a monthly report showing the changes in rabbit population, using the May report as a basis. They have also been asked to give details of the action taken arising from the Rabbit Inspector's reports of his inspections and to advise the Department of any outbreaks of myxomatosis, and of rabbit-breeding, noted in the District.

Rabbit Control Advisory Committee Established.—The Minister has set up a Rabbit Control Advisory Committee consisting of two representatives of the Council of Advice to Pastures Protection Boards, one representative of the C.S.I.R.O., and three Departmental officers, namely, the Chief, Division of Animal Industry (Chairman), the Pastures Protection Officer and Pastures Protection Field Officer.

This Committee will consider the information supplied by Pastures Protection Boards each month and will advise the Minister and the Department upon actions it considers necessary to control the rabbit pest.

Dingoes.—The Lower North Coast and Tablelands Dingo Destruction Board and the Central Tablelands and Hunter Dingo Destruction Board have shown active interest in aerial baiting; and have dropped baits over considerable areas of rough, inaccessible mountain country.

Assessment of results is difficult but the Boards have reported that sheep are now being depastured in areas previously unuseable owing to dingo infestation. From this they have deduced that the aerial baiting has had good results either by driving the dingoes further back into the mountains or by killing off a sufficient number to reduce the menace.

Landholders also are becoming interested in aerial baiting. It is reported that a number of landholders, using the 'planes engaged for spreading superphosphate, have dropped baits.

Number of licences issued to keep fur-bearing rabbits.—Eighteen licences were issued in 1956-57 and 36 in 1957-58.

Travelling Stock Reserves.—Since 1st July, 1957, inspections have been made in the following Districts:—Moree, Walgett, Singleton, Pilliga, Condobolin, Hay, Glen Innes, Grafton, Braidwood, Yass, Mudgee, Bathurst.

Although 1957 was one of the driest years this State has known there was good feed on the Stock Routes at the beginning of the year, and large numbers of stock were put on the routes to travel for grass. This showed up weaknesses in water supply. Before mid-year, many travelling stock routes were closed owing to lack of water. It also emphasised that areas held under Grazing Permit were quickly denuded of feed.

There has been so little stock traffic over the Stock Routes between 1950 and the end of 1956, that the dry period of 1957 gave a good indication of what may be expected in any succeeding dry period. It also showed which Stock Routes can and will be used. This information will be of value when considering future withdrawals of Reserves from the control of Pastures Protection Boards.

The Minister has set up a Stock Routes Advisory Committee to advise him generally on action that should be taken by Pastures Protection Boards and the Department in maintaining and improving the facilities for travelling stock. The Committee consists of two representatives of the Council of Advice to Pastures Protection Boards, and three Departmental representatives, namely, the Chief, Division of Animal Industry (Chairman), the Pastures Protection Officer and the Pastures Protection Field Officer.

Applications for revocations, of parts or the whole of Travelling Stock Reserves, dealt with from the 7th December, 1951, to the 30th June, 1957, totalled 2,539. During the twelve months to 30th June, 1958, a further 592 applications were dealt with. The cases and acreage involved may be summarised as follows:—

	Reserves No.	Acreage
1. Recommended for withdrawal with consent of Pastures Protection Boards	1,693	113,383 (i)
2. Recommended for withdrawal without consent of Boards	348	43,455 (ii)
3. Referred to Land Board by Minister, for inquiry, but not yet completed	3	714
4. Referred to Land Board by Minister, for inquiry— (a) Land Board recommended part revocation (b) Land Board recommended against revocation	5 4	604 239
5. Boards not agreeable to revocation— (a) Investigation upheld Boards' decisions..... (b) Recommended for re-investigation at later date	491 32	73,318 (iii) 7,557 (iv)
(c) Awaiting investigation	501	10,275 (v)
6. Awaiting replies from Boards as to whether they are agreeable or otherwise to revocation	182	9,062 (vi)
	3,259	258,607

(i) This figure excludes the unknown acreage of 267 Reserves.

(ii) This figure excludes the unknown acreage of 6 Reserves.

(iii) This figure excludes the unknown acreage of 53 Reserves.

(iv) This figure excludes the unknown acreage of 2 Reserves.

(v) This figure excludes the unknown acreage of 212 Reserves.

(vi) This figure excludes the unknown acreage of 71 Reserves.

In 1950 the Pastures Protection Boards were requested to survey the Reserves in their Districts and advise as to which would be surplus. As a result and prior to the amending Act in 1951, fourteen Boards advised that they were agreeable to relinquish 128 Reserves or parts thereof. The acreage involved in these cases totalled approximately 15,000. The following figures indicate the position in regard to Reserves during the years ended 30th June, 1957, and 30th June, 1958:—

Period	No. of Reserves Applications Received	No. of Reserves Applications Rejected By Boards	No. of Reserves Investigated
1st July, 1956, to 30th June, 1957	478	216	283
1st July, 1957, to 30th June, 1958	592	220	208

Staff Statistics—Pastures Protection Boards

Numbers	Year ended	
	30th June, 1957	30th June, 1958
Veterinary Inspectors—		
Appointed	5	2
Transferred	4	Nil
Resigned	3 (inc. 2 acting)	2
Retired	1	Nil
Died	1 (acting)	Nil
Secretaries—		
Appointed	8	12
Resigned	4	8
Retired	2	4
Rabbit Inspectors—		
Appointed	9	9
Resigned	1	2
Retired	1	0
Died	1	0
Appointed as Ranger	33	2
Dismissed	Nil	2
Rangers—		
Appointed	57	8 (inc. 1 part time).
Resigned	Nil	3 (inc. 1 part time).
Retired	Nil	1
Dismissed	Nil	1

Veterinary Inspectors Award.—A new Veterinary Inspectors Award has been adopted, retrospective to 1st February, 1957. This specifies a career scale of salaries in place of the former salary scale which was based on the classification of districts.

Under the new award, inspectors in certain districts, designated "special" receive a specific allowance over and above the award salary.

Pastures Protection Board Secretaries Award.—As from 1st March, 1958, the Pastures Protection Boards Secretaries Agreement has been superseded by the Pastures Protection Boards Secretaries Award, effective for a period of three years. Salary increases of 12½ per cent., 10 per cent. and 7½ per cent. according to size of the Board have been provided. In addition it is provided that a Board may, after a period of continuous and satisfactory service by a Secretary increase his salary by 5 per cent. after two years and by an additional 5 per cent. after five years. A climatic allowance has been provided for specified districts.

Biometrical Branch

Summary of Main Services.—This Branch specialises in experiment methods research. It is continuously available to other sections of the Department for consultation on design of experiments. It provides also the critical statistical analysis of the results of experiments, to assess the significance or reliability of the conclusions to be drawn from them. The services continued as in previous years.

Group Section of the Dairy Herd Improvement Scheme—Punch Card Records.—The Hollerith Punch-Card Section, formed in 1956, processed the records from the Group Section of the Dairy Herd Improvement Scheme covering some 53,000 cows in 1,400 herds.

Annual Herd Summaries to each Farmer.—Each co-operating farmer is supplied with an Annual Herd Summary of production for his herd. Lactation records are first grouped into age-classes at calving and then listed in descending order of fat production within each age-class.

Particulars of breed, date of calving, times calved, and number of recorded lactations, are shown for each animal; as well as length of lactation, milk production, fat production and percentage test.

Average production for each age-group in the herd, and two herd averages, one for 6-10 month lactations, the other for 1-10 month lactations, are shown on the summary for each farm.

Unit and District Summaries.—Further condensation of records produces Unit and District Summaries on which average herd production for each farm is listed by the tabulator and averages for Unit and District are shown.

Other summary tables summarise for each District and for the State such information as the average production of different breeds; of different age-groups; of cows with lactation of different lengths; and such information as the production of the best cow and best herd in each District.

Sire Survey Records.—A full set of Sire-Survey records is being maintained for all sires any of whose progeny is recorded under the Group Scheme. A Survey Sheet is kept for each of the sires in use, and, initially, milk and fat production for every recorded daughter of each bull have been listed in descending order of production within age-groups. Additional records are to be added to each sheet by ledger-posting from Hollerith cards as they come to hand.

EXPERIMENT FARMS AND STATIONS

Technical, subject-matter work of the various Experiment Farms/Stations/Substations of the Department is incorporated in the reports of the Divisions of Plant Industry, Animal Industry, Horticulture, Dairying, Science Services, and the Agricultural Colleges.

This section of the Departmental report is concerned only with Farm and Station developmental activities for which the Chief, Experiment Farms and Stations, and the Farm and Station Managers are responsible. Some of these activities also are mentioned in other sections of the Departmental report, e.g., under Hawkesbury Agricultural College and Wagga Agricultural College and Experiment Station.

Pleasant developments again occurred at the older established Experiment Farms and Stations. Meanwhile, newer institutions, Narrabri Experiment Farm, and Tamworth Agricultural Experiment Station, have received special attention. There has also been progress towards Alstonville Tropical Fruit Research Station.

Narrabri Experiment Farm

Within five years the waters from the Keepit Dam will be available to farmers. To acquire more information about north-western soils when under irrigation, and on irrigable crops that may be grown there, a new Experiment Farm has been established at Narrabri by the Department.



Portable Sheep Feeding Rack at Leeton Experiment Farm

Despite the acutely dry year the Department's Experiment Farms and Stations were able to meet their livestock feeding needs almost entirely intra-departmentally, and to build up a feed grain reserve for the year ahead.

(Photo. from Leeton Experiment Farm)

The property has direct access to the Namoi River on the Narrabri-Wee Waa Road, at a point some 15 miles from Narrabri. It comprises self-mulching black soils common to the north and north-west and similar to most of the farming lands to be served by the irrigation.

Considerable, establishment progress has been made on the farm. Rabbit-proof boundary fencing has been erected, irrigation supply and drainage channels have been opened, a comprehensive range of farming machinery has been acquired, and workmen's quarters and the Manager's cottage have been completed. A Manager has been appointed, and is now in residence.

Crop experiments are programmed to commence in the spring of 1958. Irrigation waters will be available, probably by September/October, 1958.

Tamworth Agricultural Experiment Station

Development of Tamworth Station has progressed. A new granary shed, an office, and a laboratory have been erected. Paddock subdivision contour planning is at a stage which now permits uninterrupted experiment work.

Cereal and linseed plant breeding and experiment work, and improved pasture trials are established. The Station has been stocked, with sheep and beef cattle, to initiate experiments on the pastures sown down within the past three or four years.

Plans for a Manager's residence have been approved. It is to be built during 1958-59.

Alstonville Tropical Fruit Research Station

Further steps have been taken to promote this Station. Surveys have been made with a view to siting administrative buildings.

Fodder Conservation Achievements

The Department's Experiment Farms and Stations were severely affected by the drought.

Despite the drought the Department's institutions fared well for stock feeds. Foresight on the Experiment Farms was such that in March, 1957, when it was evident that supplementary feeding would be the forced general practice throughout the State in the coming winter, stored stock feeds amounted to 2,629 tons of cereal, lucerne and pasture hay, 1,090 tons of silage, and 37,365 bushels of cereal grains.

As a result, almost the entire Departmental fodder requirements were intra-Departmentally supplied. Some concentrates were bought.

Moreover, even though the 1957-58 harvest was a near-failure State-wide, it has been possible by intensive adaptation to grow on the Department's coastal and irrigation Farms sufficient maize and grain sorghum stocks to meet grain requirements to the present time.

The Departmental policy of fodder conservation has paid dividends in the past, but the returns in this drought period have been outstanding.

Works Completed at the Farms

The following works were completed at Experiment Farms/Stations during the year:—Hot water services to Managers' residences, Bathurst and Leeton Experiment Farms; septic systems at Temora and Leeton Experiment Farms; agronomy offices and laboratory at Tamworth; a shed, offices and laboratory for tobacco research at New England; two hay sheds at Leeton; a new cottage and hay shed at Cowra; a machinery shed at Somersby; a garage for officers at Yanco; a dairy building, a machinery shed and the renovation of a house and shed at Alstonville.

Facilities for Short-term Schools

So that Yanco Experiment Farm could better accommodate people attending short-term schools in general farming and irrigation practice, alterations and renovation of buildings were undertaken. The results mean better living and lecturing accommodation.

At Yanco, alterations to other buildings also proceeded; to house research staff for work in the Irrigation Area in association with the Irrigation Research and Extension Committee.

Maintenance on the Experiment Farms/Stations

A major objective during the past three years has been to allocate sufficient Consolidated Revenue Fund B2 monies to permit a progressive programme of restoration, maintenance, and renovation work in respect of the Department's fixed assets on Experiment Farms/Stations.

FENCING

On the two Experiment Farms, a total of not less than 40 miles of boundary and subdivision fencing has been completed.

At Trangie Agricultural Experiment Station extensive boundary and subdivision fences have been largely renewed; work made necessary by the devastating floods of 1955.

At Condobolin Experiment Farm, the Manager has renewed a considerable portion of the boundary fencing enclosing two properties purchased some time ago. In addition, a comprehensive programme at Condobolin has completed a good mileage of internal fencing, and the enclosure and subdivision of two areas respectively needed for Plant Industry and Animal Industry experiments.

Particular mention has been made of the fencing at Trangie and Condobolin but only as illustrations. They are not isolated fencing programmes. Comparable work has been done on several other Departmental institutions.

RESTORATION OF BUILDINGS, ETC.

The Experiment Farms and Station Section has also applied itself to the restoration of buildings, to bring them to an acceptable standard. The Farm Managers have co-operated vigorously, and vied with each other in efforts to restore buildings sadly neglected during the war years and for some time thereafter because of the shortage of materials and/or funds or labour.

In this campaign, guttering, downpiping, and similar items have been renewed where necessary, timber ravaged by white ants has been replaced, and an over-all programme of painting of Experiment Farm buildings has proceeded for the past three years.

This work has lifted the appearance of the Experiment Farms. It could not otherwise than favourably affect the morale of officers and employees. In addition, it has engendered respect and favourable comment by visiting public.

WATER SUPPLIES

Provision of water for stock and domestic purposes has been urgently needed at Condobolin Experiment Farm for many years. It became a critical need when the Department assumed control of a further two properties, increasing the aggregate area of Condobolin Farm to some 4,000 odd acres. This year the work of connecting the Experiment Farm to a permanent water supply was completed. A pumping station has been established on the Goobang Creek, some half mile from the Farm across the main road and railway line. The work involved reticulation of the Water over a distance of 3 to 4 miles, and the laying of 4 inch and smaller piping.

Steps have been taken to ensure also a better water supply for spray purposes on Spray Area No. 1 and on the new horticultural area at Yanco Experiment Farm.

EXTENSION OF EFFECTIVE AREA AT DUCK CREEK

At Duck Creek substation of Wollongbar Experiment Farm some 60 acres of coastal scrub and uncleared stumps have been bulldozed. Consequently, the Manager this year was able to sow an area of maize from which excellent yields were obtained. In the coming year, this developmental work will be consolidated by sowing the area down to pastures.

ROADS ON EXPERIMENT FARMS

On all Experiment Farms, an extensive long-term road building and maintenance programme has been continued.

Experiment Farms differ from the ordinary commercial farm in that all-weather ease of access to all paddocks is imperative. This is necessary for experiment work which must

proceed in spite of working conditions, and for the transport of visitors, including overseas visitors, around the farms, no matter how inopportune the weather or its effects may be.

This year many miles of new roadways have been built and existing roadways have been graded and reconditioned. The work has been done almost entirely with Farm labour and the necessary gravel and other materials have been from Departmental sources.

An illustration of the initiative of the Farm Managers is provided from a Farm in a district where bush fires are a constant summer hazard. The Manager has constructed fire breaks in the form of roadways wherever possible. Serving two purposes, ease of access has been given to all paddocks, even in the most inclement weather.

At Leeton Experiment Farm, the extensive programme of road formation should be complete within two years. This Farm is on heavy clay soil impassable to wheeled traffic in wet weather. The country is absolutely flat, increasing the difficulty of draining water from any roadway. Even so, the Manager by energetic farm labour is overcoming the problem. The roadways are being built with a relatively high camber, and a strip of gravel to a width of 8 feet, thus giving a solid non-skid surface in all weathers.

MACHINERY FOR THE FARMS/STATIONS

Funds for the purchase of new and the replacement of old machinery at Experiment Farms have been inadequate to meet the needs efficiently. Compromise has been and will continue to be necessary. Some critical difficulties have been created by the lack of funds. The Experiment Farms Section has overcome the problems wherever it has been possible to do so by a practical approach.

The increasing role of livestock farming, underlines the need to provide for the growing and conservation of fodder. It involves tractors, and cultivating and harvesting machinery, all of which are expensive. A suitable tractor cannot be purchased for less than £1,000, and a baler is similarly priced.

In 1957-58 an allocation of £14,000 was made for expenditure on plant and machinery for Experiment Farms. From these funds, the major items purchased were three tractors, two balers, an orchard spray, three air compressors, a roughage mill, a calculator/adding machine for research use at Leeton and Yanco Farms, two sheep jetting plants, and minor items such as fertiliser distributors, trailers, and cultivating implements.

TESTING NEW MACHINES, ETC.

The Department co-operates with the Commonwealth Department of Primary Industry in suggesting the importation of new types of machinery developed overseas. When imported, their testing is undertaken by the Experiment Farms Section in collaboration with other appropriate sections of the Department.

New Type Orchard Spray.—This year two experimental types of orchard sprays have been thoroughly tested by the Division of Horticulture, in the Batlow area. The results have largely substantiated the manufacturers' claims that these machines do in fact represent a new method of spray application of great practical and economic value to orchardists.

Sod-Seeder for Rice.—In addition, the Division of Plant Industry has used a Commonwealth-purchased sod-seeding machine, to sod-seed rice directly into a permanent pasture. The tests so far give an indication that this new method could revolutionise the economics of rice growing. At least the indications are very encouraging.

Sprig-Planter for Grass.—A sprig-planter, to plant grass roots, has been extensively used throughout the State and to good effect. The New South Wales trials, and trials in other States, have led Department of Primary Industry to consider having several of these machines manufactured locally. The sprig-planter has proved most useful for laying down kikuyu and similar types of grass springs on waterways and other soil conservation projects.

Rod Weeder.—A rod weeder, an implement giving a light cultivation to a cereal fallow, and popular for such work in the United States of America, has been intensively tested at Temora Experiment Farm. The Manager has reported very favourably.

Cereal Plot Harvester.—For the past few years, the Department has sought to have an experimental type of cereal plot harvester manufactured. Initially, it was designed, and a proto-type was built, by a Departmental plant breeder Dr. W.

Single, then stationed at New England Experiment Farm. Subsequently, it was improved by Agronomist Mr. E. Mathieson.

Ultimately, a manufacturer interested to build a new machine from the original prototype at a reasonable price has been found.

The new Single-Mathieson Stripper is now undergoing trial in promising fashion. If this promise is substantiated an outstanding contribution will have been made to the machine needed in scientific/experiment plot work.

DIVISION OF PLANT INDUSTRY

Extension Services and General

Agronomists' Districts.—There are thirty-four agronomist districts and the establishment of another, Muswellbrook, has been approved. When the new "North-Western Region" is established an agronomist district with headquarters at Moree will also be established. Thus thirty-six will be the total shortly.

There is an acute shortage of agronomists to undertake district duties. Four of the thirty-four established districts, viz., Lismore, West Wyalong, Queanbeyan and Tumut are without agronomists. District agronomists at Lismore and West Wyalong were appointed as Farm Managers, the Tumut agronomist was appointed to the position of Mid-Western Regional Supervisor, and the agronomist at Queanbeyan resigned to take a position with a private organisation. The Grafton position, which had been vacant for some time, has been filled.

In-Service Training.—With the intake of several junior agronomists early in 1958 it has been possible to re-inaugurate an in-service training scheme in extension duties for a number of Experiment Farm agronomists. Ten (10) relatively junior officers, in addition to their other duties, are receiving part-time instruction in district work. Of this number, possibly four will be sufficiently advanced for appointment to districts in the near future.

Assistant Principal Agronomist (Extension).—The position has been occupied in an acting capacity since the 1st January, 1957. It was finally filled on 1st May, 1958. The duties have been expanded. War Service Land Settlement matters are an added responsibility.

Extension Activities.—Services of the Department are becoming even more widely known and appreciated by the public. Demand for technical advice is increasing but, with a shortage of trained staff, cannot adequately be met. Many landholders are now so educated as to appreciate keenly the latest developments in scientific agriculture and the business of farming. They are demanding advanced agricultural guidance which may only be met by placing sufficiently experienced officers in the field.

Since the formation of "Agricultural Regions" marked emphasis has been on publicity and extension through press articles, radio broadcasts, lectures, short-term schools and field days. On the one hand these media have directly disseminated agricultural information. On the other, they have encouraged more primary producers to seek additional advice and assistance from the Department.

With a changing economy, due to less favourable seasonal conditions and markets, the economics of many phases of farming are receiving much closer scrutiny by farmers and this trend will become more apparent with still heavier demands on the Department's services.

District Agronomists' Regulatory Work.—Whilst extension is the major function of district agronomists, they also carry out other duties, some of them regulatory. In this category are pasture and crop Seed Certification, Registered and Approved Seed schemes; inspection of Government Institutions; inspections and reports on applications for assistance under the Farm Water Supplies Act; fire, flood and grass hopper control matters; Agricultural Holdings Act, and War Service Land Settlement inspections; assistance to various local government bodies, etc.

Land Settlement inspections were less this year, but the demand for guidance by farmers under this scheme increased. With the changed seasonal conditions there was no demand for assistance relative to grasshopper and/or flood relief. However, agronomists were required to assist with the distribution of wheat from silos for drought feeding. Some also assisted with bush fire relief.

Dairy Industry Extension Grant Effect.—District agronomists are not responsible for the conduct of Dairy Grant demonstrations but they assist in the planning and supervision. The demonstrations are frequently used for field days, and provide a useful extension medium. This year emphasis has been placed on demonstrating methods of making and conserving silage on dairy farms.

Agricultural Extension Grant Effect.—Division of Plant Industry is responsible for the administration of twenty-eight projects, for which the funds allocation was £41,016 this year. Many of the demonstration projects relate to pastures and crops. They are conducted in co-operation with private farmers and designed to show improved techniques. The most important are in connection with Serrated Tussock control, and pasture establishment on problem soils.

Drought Effect.—From 1947 to 1956 New South Wales had above average seasons, although severe floods and devastating bush fires occurred in some years. In 1957 drought conditions prevailed over a large part of the State. The wheat acreage for all purposes declined to an estimated 2.6 million acres and wheat receipts to approximately 4 million bushels, the lowest for many years.

Demand for fodder was heavy, and price rises inevitable. The demand for wheat for stock feeding made rationing essential and ultimately wheat was imported from other States. A small quantity was imported from Canada.

Fortunately, with abundant carry-over of dry feed from the wet year, 1956, and very low rabbit population, stock losses were not excessive. However, breeding programmes suffered, and stock lost condition with consequent decline in production. Water for stock reached a critical level, particularly in southern districts.

Rains early in 1958 averted disaster.

Fodder Conservation

Fodder reserves are far short of requirements. The lack has caused concern to this Department for many years. In general, farmers except during drought are not particularly interested in the storage of fodder. Their quickened interest tends to fade immediately more favourable conditions return. With a less favourable economic position confronting them an appreciable change in the attitude of farmers to fodder conservation appears improbable. Economic surveys may provide the answer. The increasing interest in conservation

of fodder as silage is encouraging, but represents a very small percentage of the overall reserves. Improved designs of machinery, a growing awareness of the need to feed stock, in particular dry cows, and better knowledge of silage methods were the main reasons for more attention given to this conservation system.

Considerable interest has been shown in Hammer mills for processing fodder.

Superphosphate

Supply and Demand.—Superphosphate was in full supply and manufacturers were concerned that demand was far short of anticipated requirements. Deliveries, about 280,000 tons, were approximately the same as in the previous year. Seasonal conditions, coupled with the fall in prices of wool and other primary products, were the principal reasons for the static demand.

In 1956, rainfall was well above average, pastures made prolific growth and the wet soil conditions delayed topdressing. The position was reversed in 1957 when drought conditions prevailed and farmers used those reserves of superphosphate. Moreover, some landholders had to make heavy purchases of fodder to feed starving stock. Consequently, funds were restricted for the purchase of fertilisers.

Aerial Top-dressing Increased.—A feature of superphosphate application was the attention given to topdressing from the air. This was particularly interesting because of the opportunity for treating hilly country on the tablelands. A large proportion of it is suitable for pasture improvement, but topdressing from the ground is usually uneconomic because of the terrain.

In 1951, approximately 1,000 tons of fertiliser were applied from the air. By 1958, the quantity had increased to 48,000 tons; approximately one-fifth of the fertiliser applied to pastures. In New South Wales there are 13 to 15 million acres of hilly to steep land which may only be economically top-dressed from the air. Aerial topdressing costs approximately £5 per ton.

Bulk Handling of Super.—A recent development is the handling of superphosphate in bulk. Some previous bulk handling had been done, on a limited scale, by road transport from the works, but only recently was superphosphate bulk transported by rail in quantity. In the first six months of 1958 some 10,000 tons have been handled in bulk.



Superphosphate Top-dressing of Pasture from the Air has Greatly Increased

About 1,000 tons of fertiliser were applied from the air in 1951. Some 48,000 tons were so applied in 1958. In New South Wales there are near to 15 million acres of hilly to steep land which may only be economically top-dressed from the air.

(Photo. from Tamworth Office)

Bulk superphosphate is 21s. per ton cheaper than that supplied in bags and, for large quantities, it can be transported and applied more economically.

Sulphur

Responses to sulphur have created a demand. It has been applied mainly in gypsum or sulphur-fortified superphosphate.

War Service Land Settlement

The position of Special Agronomist (War Service Land Settlement) rendered vacant by the appointment of former occupant Mr. J. W. Boyle as Special Agronomist (Maize) was not filled. Duties of the position have been added to those of the Assistant Principal Agronomist (Extension).

Increased attention was given to organising field days, particularly for settlers entering into occupation of their blocks. Other departments and local government bodies co-operated with this Department in the field days.

Statistics.—The following statistics give an indication of activities in War Service Land Settlement as at 30th June, 1958, and 30th June, 1957:—

	As at 30th June, 1958	As at 30th June, 1957
Total number of settlers so far established ...	2,606	2,527
Total number of settlers so far established under the Acquisition Scheme ...	1,243	1,199
Total number of settlers so far established under the Promotion Scheme ...	1,360	1,325
Farms brought under the Scheme by conversion ...	3	3
Total area involved in the farms acquired ...	2,942,033 acres.	2,853,603 acres
Total expenditure, in purchase only ...	£19,419,612	£18,875,409

Pastures

GENERAL

Pasture Statistics.—Latest official figures are as at 30th March, 1957. They show the area under sown grasses and clovers as 9 million acres, an increase of 1½ million acres over the previous year.

Conditions for most of the State were obviously unfavourable to pasture growth or establishment of new pastures.

Drought Qualities of Lucerne and Phalaris.—Though recent conditions have not favoured great expansion, the long-term effect may be advantageous. In recent years the seasons have been such that over-wide use has been made of species less drought resistant. The dry 1957 has refocused attention on the drought resistant qualities of lucerne, and *Phalaris* in particular. Agronomists in all parts of the State have instanced the performances of these plants when others had died out or were dormant. Large areas were sown to them during the autumn of 1958.

Pasture Increase.—In areas where sown pastures have been a feature for some years, the production of pasture has increased.

Pasture Insect Pests.—Pasture insects have become more prevalent. In addition to the normal range of insects causing pasture damage, the amnemus weevil originally shown to be a major limiting factor to pasture growth on the far north coast has been active as far south as Berry. The Black Soil Scarab continued to damage seriously all types of pasture and crops in the north-west. Unless satisfactory control is found, or natural factors reduce the grub population, this scarab could seriously threaten the whole of the black soil area of this section of the State.

Pasture Trials and Experiments

Farmers' Pasture Trials.—District agronomists established 117 farmers' trials, covering various aspects of pasture establishment: fertilizer rates, lime usage, seed inoculation methods and species comparisons.

Extension Grant Demonstrations.—District agronomists also established on farms 357 demonstration areas under the Agricultural Extension Grant. Many are of the single block type, demonstrating standard methods for the district.

Experiment Farms/Stations.—Pastures investigations continued at Hawkesbury Agricultural College, the various Experiment Farm and Stations, and at several other locations.

The pastures research can be grouped into several broad categories, viz., species improvement; pasture establishment including methods of sowing; fertilizer and lime usage and inoculation; pasture maintenance; and pasture-stock relationships.

Species for Dry Conditions.—Additional species suitable to the drier inland districts, particularly the central and north-west, and the north coast, are needed. In fact, they are important for all districts, as evidenced this year by the renewed interest in the few available species with adequate drought resistance.

Species investigations have therefore been accorded the highest priority at Experiment Farms, particularly at Trangie, Yanco and Temora, serving the drier inland areas, and at Grafton and Wollongbar serving the north coast.

Three agronomists have been given a major responsibility—to build up supplies of seed of promising species, to speed up testing and release for commercial utilisation.

In consequence, several plants which warrant widespread testing to assess their range of adaptability have been selected. In some cases, where seed is available, they are for immediate commercial utilisation. Amongst the latter are the Molopo and Biloela strains of Buffel grass, the Katambora strain of Rhodes grass and the Bambatsi strain of *Panicum coloratum*. These grasses should prove valuable additions to those available for sowing in the central and north-west. The Buffel and Rhodes grass strains could also have a place on the coast. There, *Setaria sphacelata* has also proved promising. It has a longer growth season than *Paspalum*.

Perennial Grasses, Grazing Trial.—At Temora Experiment Farm, a grazing trial incorporating several new perennial grass species has commenced. The trial has dual importance. The perennial grasses provide pasturage over a longer period than the standard, Subterranean Clover-Wimmera Rye mixture. In addition, being capable of utilising the nitrogen built up by the Subterranean Clover, they may provide an answer to the problem of weed encroachment in Subterranean Clover pastures.

Summer Legumes, North Coast Pastures.—At Grafton, and to a lesser extent at Wollongbar, emphasis was on the search for summer legumes capable of growing in association with and augmenting the feed value of *Paspalum*, particularly during the late summer and autumn.

The work pointed to several species, viz., *Dolichos lab lab*, *Dolichos bifloris*, *Desmodium uncinatum*, *Glycine javanica* and *Aeschynomene falcata*, as worthy of widespread trial on the north coast. Although regarded as tropical and sub-tropical species, some of them showed promise as far south as the Bellinger River.

A complication is that many tropical species have toxic principles. Therefore, at Grafton Experiment Farm it has been necessary to carry out preliminary feeding trials, using guinea pigs, to select non-toxic strains.

Over-Seeding Natural Pasture.—One of the outstanding results in the field of pasture establishment was the Yanco Experiment Farm finding that even under severe conditions over-seeding of natural pastures with Dwalganup strain of Subterranean Clover resulted in satisfactory establishment and a vast improvement in the pasture. During the recent adverse autumn the over-seeded area were considerably superior to unimproved natural pasture.

Longevity of Seed in Adverse Conditions.—Trials in the Western Division showed that where conditions following the sowing period were unfavourable for germination, seed of some of the species used would remain viable in the soil for at least twelve months and germinate when suitable conditions prevailed.

Phosphate Deficiencies, Coastal Work.—Work in the Bellinger area confirmed earlier findings that some unproductive coastal soils were very deficient in phosphates and that heavier than normal dressings of superphosphate are needed for satisfactory establishment.

The finding was emphasised by work at Wyong. This conclusively showed that, when seed and fertilizer were broadcast more than double the rate of superphosphate was required to produce the result obtained when seed and fertilizer were sown in close proximity in drills. As most pastures on the coast are sown by broadcasting, many failures on the second class soils probably result from phosphate deficiency.

Legume Nodulation Factors.—In the pasture establishment investigations, problems associated with legume nodulation received attention.

In particular, efforts were made to determine the conditions under which lime pelleted seed could be used, and the conditions where it is necessary to use the 50-50 superphosphate-lime mixture.

Lime Pelleting of Seed.—Twenty-nine trials were sown on various soil types in various parts of the State. In general, the pelleted seed was found satisfactory in inland districts. On the more acid soils of the coast and some tableland soils a heavier lime dressing was required to secure satisfactory initial nodulation and re-establishment of the clover.

Bellingen work confirmed the present trend in lime usage; that, 2 tons of lime broadcast resulted in little better nodulation than 2 cwt. lime drilled with the seed. Subsequent growth, under each of the two treatments, was equal.

Phosphate and Sulphur Needs.—At Walcha it was shown that clovers may be established successfully without any fertilizer, but that production was extremely low until the phosphate and sulphur requirements of the soil have been met.

Nutrition for Pasture Maintenance.—Trials at New England Experiment Farm and at Walcha demonstrated the importance of sulphur as a fertilizer in this region.

Also at New England, the use of boron significantly increased the seed yield of lucerne.

Likewise, phosphatic and nitrogenous fertilizers increased the seed yields of *Phalaris*.

Considerable interest has developed in respect of the role of nitrogenous fertilizers in pasture management. Several trials to investigate have been commenced.

Lucerne renovating and topdressing trials at Wagga Agricultural College have cast doubt on the need of renovation in this environment. Topdressing with superphosphate, however, resulted in an increased yield of protein.

Pasture-Livestock Relationship Trials.—Trials in this field have been commenced. At Leeton Experiment Farm, production in terms of stock at different grazing intensities on irrigated pastures were measured; and the effect of the various grazing treatments on the pasture were determined.

A comparison, over three years, between natural pasture and sown pasture, in terms of dry matter and protein yield, has recently completed at Shannon Vale Nutrition Station. It indicates that even on this poor quality soil sown pastures produce two to four times the dry matter yield of natural pastures and approximately one and a half times more protein per unit of dry matter.

Pasture Seed Certification

Because of the dry season, certified seed production was very much below that of the previous year, e.g., only 1,100 tons of certified Subterranean Clover seed, compared to over 2,000 tons in the previous year. There was little production of White Clover or Barrel Medic seed.

Seed Testing Laboratory

Effectiveness of the Seed Testing Laboratory was increased by locating all staff at head office. Little delay occurred in dealing with samples, although the number of samples and tests was in excess of that of the previous year.

The Lakon biochemical test for viability of maize was introduced. It facilitated the testing of certified maize samples. Test time was reduced from a maximum of 9 to 2 days.

The Seeds Officer prepared a chapter of some 10,000 words on seed testing for inclusion in the agricultural textbook being produced by the Australian Institute of Agricultural Science.

Agricultural Seeds Act—Regulatory Activities

The regulatory activities have become more difficult because of the increasing numbers of vendors and the diverse business activities of many of them. Action has been taken to bring to the notice of many in this category their responsibilities under the Act.

Inspections and Prosecutions.—Inspectors visited 205 stores in country towns and 75 in the metropolitan area. Legal action was taken against five vendors for infringements of the Act, and warnings were issued to others. The inspectors attached to the Seeds Section also made some inspections under Acts administered by other Divisions of the Department.

Weeds

GENERAL

Special Weeds Conference.—This was held in Sydney in August, 1957, to follow up the series of six Regional Conferences held in the previous year. The Minister for Agriculture and Food Production, representatives of local government, of Pastures Protection Boards, farmers' organisations, and appropriate government departments attended.

The Conference stressed the urgent need for increased financial assistance to local government authorities for noxious plant control, for the formation of Weeds County Councils as the most effective administrative bodies, and for increased research and advisory services on weeds.



Sorghum alnum

Observation of a line of *Sorghum alnum* with straw-glumed seed, readily distinguishable from the customary black colour, has been followed up by the plant breeders. As a seed identification aid it could be important to the future of this species which until now has in part been hampered by intrusion of the indistinguishable seed of Johnson grass (toxic)

(Photo. from Bega Office)

Government Grant to Councils Increased.—Following that Conference the grant to Councils was increased by £5,000 to £25,000. In addition, the Government empowered the Rural Bank of New South Wales to make advances through its Government Agency Department for the eradication of Serrated Tussock. The advances are at concession interest rates and repayable over a relatively long term of years.

Co-operation with Local Government Bodies.—Many Councils were very active in weed control. The various Weeds County Councils, in particular, achieved good results.

Supplementing the Department of Local Government grant of £25,000 to assist Councils in noxious plant control, the Councils contributed at least as much.

On a recommendation approved by the Minister for Agriculture and Food Production, the Government grant was distributed as follows:—

	£
9 County Councils (comprising 35 Shires and 12 Municipalities)	16,200
38 Shires	8,000
12 Municipalities	800

In the dry seasonal conditions, requests for assistance were less than normal but the funds were fully expended early in 1958.

Weeds Revision Group Conferences.—These, for two groups of Shires and Municipalities, were held at Mudgee and Quirindi respectively. Their result was a number of changes in the declarations of noxious plants in the areas concerned.

Weed Specialist's Extension Services.—District agronomists provided a lot of the advice on weed control sought by farmers and others, but in addition there has been a strong demand for specialised advisory service. This has come from herbicide manufacturers, Shire and Municipal councils, Weed County Councils, farmers' organisations, and others.

Apart from the regular and intermittent contacts with those bodies, the specialist lectured on weed control to a Conference of Council Weeds Officers (Southern Region), a Bankers' Conference at Goulburn, an Aerial Agricultural Conference, an Agricultural Bureau Convention, a Cannery Operatives School, a Pastures and Animal Husbandry School, and other group functions.

Extension Demonstrations.—Twenty demonstrations with herbicides were established. They provided valuable extension information. Work of the demonstration Mobile Weed Spray Unit was restricted, because of the dry conditions.

New Hormone Type Weedkiller, 2,4-DB.—This 2,4-Dichlorophenoxybutyric acid is a development of particular significance and was subject of widespread testing. It is proving of special value for control of broadleaved weeds in lucerne and clovers. Weeds are a major problem in the establishment of lucerne, particularly on river flats; and often also in establishing irrigated pastures. Other chemicals have had limited application in these circumstances; damaging to legumes.

In trials, 2,4-DB controlled a wide range of broadleaved weeds in the seedling stage, with very little damage to the legume. It permitted rapid establishment and much better growth. However, it has needed favourable growth conditions for satisfactory effect on the weeds.

SERRATED TUSOCK RESEARCH AND EXTENSION

The Serrated Tussock problem of the central tablelands continued to be a major subject of research and extension.

Demonstrations of Pastures for Control.—More demonstrations were established; and areas which failed in the previous year, owing to drought, were re-sown.

Many of the demonstrations established in recent years have continued to provide effective control. Concurrently they have demonstrated the value of pasture improvement on the tablelands, particularly during dry times.

The season has emphasised the value of the well prepared seedbed in pasture establishment and in Tussock control; and the need for careful management of pastures. Re-infestation occurred in certain demonstrations where seedbed preparation was inadequate or where excessively heavy grazing had occurred.

Establishment of legumes is a primary problem and many species, varieties and methods were tested. Various methods of pelleting the seed to increase establishment were tried with promise of success.

Of the clovers tested, subterranean clover gave by far the best regeneration, although certain other species were better in terms of initial establishment. In particular, alsike clover established well.

Establishment of grasses was unsatisfactory and work in this aspect will be continued.

Building up the nitrogen content of the soil to a high level increased the digestibility of Serrated Tussock so that it was more readily eaten by stock.

Control on Non-Arable Land.—Research on Serrated Tussock control was carried out at Bathurst, Rockley and Mittagong. It concentrated on the problem of control on non-arable land.

The research based on the Bathurst Experiment Farm produced very promising leads for the treatment of tussock on non-arable land. The principles include aerial seeding of clovers, combined with the judicious use of fire, careful pasture management, and the possible use of herbicides.

As a result of this research, Upper Macquarie County Council subsidised the aerial sowing of several hundred acres of non-arable lands infested with Serrated Tussock.

The main problem is to determine the methods of establishment and management of improved pasture species in such a way as to favour their growth at the expense of Serrated Tussock.

Herbicides.—These were further tested for destruction and retardation of the Tussock. The two best materials were Dalapon and TCA. Contrary to expectations, results with Dalapon were very good during the dry season. It yielded effective kills with as little as 5 lb. per acre.

It was also shown that herbicides may be applied to tussock after germination of clovers without any marked deleterious effect on the clover.

Judicious Use of Fire.—This temporarily retarded Serrated Tussock, but it is apparent that, without subsequent pasture establishment, fire could lead to a rapid increase in infestation.

"Farmer Awareness."—There has been increased "farmer awareness" of the need for action. In the Upper Macquarie County District most landholders took action, particularly for the control of light infestations.

MISCELLANEOUS, WEED CONTROL RESEARCH

Weed Invasion of Clover Pastures.—A problem of concern throughout the southern half of the state was invasion of subterranean clover pastures by a range of annual weeds such as Slender, Black, Variegated, Scotch, and Illyrian thistle, Paterson's Curse, Capeweed and inferior grasses such as Barley grass and annual Brome grasses.

The problem seems to involve a nutritive imbalance in the soil after a period of years of clover pasture. One agronomist reported rapid improvement after a crop of oats on an infested area. The oats reduced the proportion of available nitrogen in the soil.

Weeds in Vegetable Crops, Chemical Control.—Herbicides for control of weeds in vegetable crops were investigated mainly at Hawkesbury Agricultural College, but also in plots at Maitland, Bathurst and Griffith.

Pre-emergence Spraying of Onions.—A wide range of chemicals and the effect of time of sowing and other factors were studied in extensive trials. The most satisfactory chemicals were CDAA, CIPC and Monuron. Seasonal differences have been marked in herbicidal efficiency, in crop tolerance, and in composition of the weed population.

With early sown onions, CDAA proved far superior to other materials but has shortcomings. It was not affected by heavy rain falling within a few days of treatment. However, with late sowings, CDAA damaged the onions. CDAA proved satisfactory when applied during the fortnight following sowing, but its efficiency was greatly reduced where the soil contained much organic matter.

Post-emergence Spraying of Onions.—The following, applied in the cotyledon stage, gave excellent results CIPC (4 to 6 lb. per acre), 2,4-DB (2 lb. per acre), and Monuron (½ lb. per acre).

CIPC in Carrot and Parsnip Plots.—Excellent control of weeds in carrots and parsnips was obtained in a number of trials with CIPC applied, pre-emergence, at 4 to 5 lb. per acre. Up to 8 lb. of CIPC per acre had no effect on carrots in the trial.

Dalapon in Beetroot Plots.—In beetroot trials, the best 100% not entirely satisfactory weed treatment was Dalapon, at 4 to 6 lb. per acre, applied at the 2 to 4 leaf stage of crop growth.

Neburon in Tomato Plots.—In several trials at Griffith, Neburon applied after transplanting controlled broadleaved weeds without damage to the tomatoes.

Catshead in Pastures, Chemical Control.—Several trials have been conducted for chemical control of Catshead (*Emex australis*) in pastures. Best results were obtained with 2,4-D and 2,4-DB.

Controlling Weeds in Seedling Lucerne.—In co-operation with herbicide manufacturers, trials to test 2,4-DB for this purpose were established at Richmond, Maitland, Forbes, Mudgee, Mullaley, Berry and Bathurst. Results in general were successful. Several weeds have been controlled with little or no damage to the lucerne, thus permitting satisfactory establishment. In some cases damage to lucerne occurred and some important weeds were not controlled.

It was noted, that satisfactory results with most weeds depended upon the spray being applied while the weeds were very young and growing actively. Dry conditions or more mature weeds invariably gave poor results.

Among the crop plants which have shown a useful degree of tolerance to 2,4-DB are Barrel and Burr Medics, Berseem clover, and most of the pasture clovers.

Dalapon was tested for control of annual grasses in lucerne with promising results at about 4 lb. per acre.

2,4-D and Bergalia Tussock Control.—Methods to increase the effectiveness of 2,4-D for Bergalia Tussock control are still being investigated. The main problem is to increase translocation to the growing points.

Chemical Control of Barnyard Grass in Rice.—Trials for control of various forms of Barnyard Grass in rice were commenced. Several chemicals, including CDAA, CIPC and DNBP, applied in the first few weeks after sowing, are promising.

CO-OPERATION WITH HERBICIDE MANUFACTURERS

Close liaison was maintained with herbicide manufacturers in interchange of information, in supply of materials for research purposes and in laying down co-operative experiments in various parts of the State.

Particular mention is made of the generous action of Timbrol Company, Fisons Chemicals Pty. Ltd., and I.C.I.A.N.Z. in laying down co-operative trials, often at the request of the Department.

PUBLICATIONS ON WEEDS

Roneed leaflets have been issued through the year on "Long Styled Feather Grass", "Weed Control Simplified (for the home gardener)", "Simazin", and "Vapam". A "Weed Section" of the "Monthly Agrostology Notes" has also been regularly compiled.

Vegetable Section—General

The season was one of heavy vegetable production. With decline of income from other pursuits farmers tend to look towards vegetables to make up the deficit, and many new growers have entered. This has been reflected in the enquiries by potential vegetable growers.

At New England Experiment Farm the potato improvement programme continued to expand. 10,000 seedlings were raised in the glasshouse and 150 crosses were made. Extraction and cold storage of pollen were successful. A new refrigerator for the potato breeding work has been extremely useful. Many types of pollen of different ages are now stored, so at no time was shortage of viable pollen experienced.

At Hawkesbury Agricultural College breeding of improved varieties of tomatoes, beans and peas continued and with the appointment of an additional vegetable agronomist, vegetable experiments have been resumed. Tomato hybrids released from Hawkesbury College continued to give good results throughout the state, and seed production has been undertaken by growers and seed firms.

At Bathurst Experiment Farm, experiments were facilitated by appointment of an officer full-time on vegetable production problems. Consequent research attention was given to tomatoes, crucifers, beans, and peas, for canning and quick freeze.

At Yanco Experiment Farm the evaluation of canning pea varieties is now an important project and the provision of an experimental pea viner and maturometer have been of great help.

On the south coast the appointment of an additional Seed Certification Officer facilitated inspection and sealing of the greatly increased acreage of French bean seed submitted and certified.

Potatoes

POTATO BREEDING

At New England Experiment Farm 150 crosses and selfs were made, using the method of sowing in bricks. Pollen under cold storage was also used with great success. The main pollen parents included Merrimack, Cherokee, Adina, Crana and Menominee. Female parents used were Sequoia, Sebago, Delus, B922-6, Saco, 1816(a)14, and 2079(ab)7.

Selection of Parents for Various Objectives.—Further progress has now been made. Saco and B595-76 from U.S.A. are expected to be very useful especially in combination with the Departmental varieties Adina and Awaba.

Katahdin, Adina and Awaba appear to be the best pollen parents for the introduction of commercial quality. Some local advanced seedlings, some of which are pollen fertile, are likely to be superior.

10,000 Seedlings were Sown and Harvested.—Six selections were made from 11-79 x Cherokee, 11-79 x Crana, 1928(e) x B2368-4, S2776 x B2368-4, S2654 x Merrimack, and Crana x Cherokee.

2nd Year Seedlings.—Some 200 second-year seedlings were grown and 152 selections were made. The most promising selections were from: Menominee x B2368-4, S285-4 x Cherokee, 1928(e)2 x B2368-4, 914(a)91 x Adina, 1928(e)2 x S2840 and Sequoia x Cortland.

3rd Year Seedlings.—Forty-two selections were made from one hundred third year seedlings. The best were from the crosses Bismark x 11-79, 66-10 x 11-79, Aquita x Katahdin, 1284 x 11-79, 1928(e)2 x Katahdin, and Cherokee selfed.

4th Year Seedlings.—Forty-one fourth year seedlings were grown. Excellent selections were from Monak x 11-79, S2540 x Adina, 19162 x Adina, and 76-15 x Saranac.

Advanced Seedlings.—Thirty-five advanced seedlings were grown in a preliminary field trial. The most promising were S2821 (835a-4 x Awaba), S2860 (835a-4 x Adina), S2861 (835a-4 x 11-79), also two selections from Monak x 11-79 and two from Awaba x 336-123.

POTATO INTRODUCTIONS

The most promising were Merrimack, Saco and Redburt from the U.S.A. Redhurst is a high quality, red-skinned variety. Sanso from Canada again produced tubers of good quality.

Introductions of promise as disease resistance parents include Tawa and B595-76 from the U.S.A.; and 2079(ab)7, 1816(a)4 and 1563(c)14 from Scotland.

DISEASE RESISTANCE

Immunity to Late Blight.—Of the seedlings tested by Biological Branch, fourteen were immune to the common races of late blight. These included twelve selections from 11-79 x Cherokee, one from Pungo x Cherokee and one from 914(a)91 x Adina.

Two advanced seedlings S2860 (835a-4 x Adina) and S2861 (835a x 11-79) immune to the common races of late blight are being increased at Orange.

Resistance to Common Scab.—The preliminary results of a method of testing the resistance of young seedlings to common scab by growing in infected vermiculite were very promising. A good even infection of the small tubers was obtained.

SOIL FERTILITY INVESTIGATIONS

Pasture Period Effect.—The demonstration in co-operation with Guyra Potato Growers' Association was continued. Although the dry season gave a very poor temporary pasture, the permanent pasture was not badly affected.

The project again demonstrated the value of a clover pasture in restoring fertility to the over-cropped red soils at Guyra. The highest yield, 5 tons per acre, of potatoes after pasture is a significant improvement over the return from the continuously cropped areas. These ranged from 1.1 to 2 tons per acre.

FIELD TRIALS

Twenty-three district trials were conducted, compared to twenty-two in the previous season. Yields were high in spite of dry weather.

Two new seedlings, S2860 and S2861, and two introduced varieties, Pungo and Cherokee, were forwarded from New England Experiment Farm for seed increase and field testing at Orange.

At Orange the seedlings S2702 and S2700 and the variety Ontario performed best in the early maturing section. S2671, S2770, S2842 and S2680 were outstanding in the late trial. Elsewhere in tableland trials S2702, S2700, S2770 and S2671 gave consistently good results, with S2680 and S2705 showing to advantage at Blayney and Oberon, respectively.

In early districts S2702, S2705 and S2700 performed well in all trials, while Ontario and Kennebec (two from the U.S.A.) were fair to moderate.

The seedlings S2705 and S2680 have given consistently good results over many years of trial, but S2705 has produced misshapen tubers and, in spite of high yield, will be discarded.

S2680 is a red-skinned variety with field resistance to common scab but in some circumstances it also produces badly shaped tubers. Resistance to scab makes it valuable for scab liable soils. Therefore it may be named and recommended for use in specific districts.

POTATO SEED CERTIFICATION

The Potato Seed Certification Officer assumed responsibility for the field inspection of seed crops in southern tableland areas.

Certification Acreage and Entries Increased.—The number of growers and the area submitted for certification increased over the previous season. Some 1,318 acres were entered in 1957-58, compared to 1,072 acres in 1956-57; and 160 growers submitted crops compared to 139 in 1956-57.

The areas certified totalled 1,148 acres compared to 923 acres in 1956-57.

The health standard of the crops entered for certification has improved since the Seed Certification Scheme was introduced. In 1949, for example, 48.10 per cent. of the crops inspected were rejected; compared to 14.1 per cent. during the last season.

Variety Walanga Excluded.—Tests by Biological Branch in the past season revealed that many Walanga crops were carrying a high percentage of Rugose Mosaic (potato virus X plus potato virus Y). It is tolerant to the virus and thus not seriously affected. However, as Walanga can carry the disease it is considered that growing this variety in tableland areas represents a hazard to the Potato Seed Certification Scheme. Therefore it has been excluded from the Seed Certification Scheme.

MISCELLANEOUS INVESTIGATIONS, ETC., WITH POTATOES

Quality Testing.—Quality testing of potatoes was continued as a co-operative project with the Division of Food Preservation and Transport, C.S.I.R.O. Three varieties, viz., seedlings S2704, S2671 and Sebago, were outstanding in all quality characteristics.

Cut-Setts' Pre-emergence Decay.—Experiments to prevent pre-emergence decay were continued. Treatments worthy of mention include whole single setts untreated, tubers cut and treated with 6638-39, and tubers cut and treated with Agrimycin 100.

Potato Seed Spacing Trials.—Trials in Guyra district to determine the effect of closer planting of potato setts on size and quality of resultant tubers demonstrated that closer planting decreased the amount of hollow heart and growth cracking and lowered significantly the proportion of oversized tubers. Closer planting also produced a much more uniform sample, in seed and table potatoes, at the same time increasing the yield.

The 9-inch spacing produced a very good quality sample of seed potatoes, though the proportion of tubers below 4 ounces did not always differ significantly from the proportion in the 12-inch spacing.

Agricultural Extension Grant Demonstrations.—A potato fertiliser demonstration at Orange clearly showed the soundness of the principle of increasing yields of potatoes through increased rate of use of superphosphate. Consistent increases have been obtained with each cwt. of superphosphate applied.

In the demonstration, where rates of 4, 6, and 8 cwt. of superphosphate were used, the yields were in proportion to the superphosphate applied. This project was initiated to encourage potato production in a time of scarcity. It still serves a purpose, illustrating a way in which method of production may be used to offset low prices.

Tomatoes

TOMATO BREEDING

Breeding was continued at Hawkesbury Agricultural College to obtain improved varieties resistant to disease, and also suitable for glasshouse culture. At Yanco Experiment Farm, breeding was continued to produce wilt-resistant varieties of good agronomic quality suitable for processing.

At Hawkesbury College.—The hybrids Break O' Day x Rouge de Marmande, Grosse Lisse x Rouge de Marmande and Valiant x Grosse Lisse released from Hawkesbury Agricultural College continued to give good results throughout the State. Seed, especially of Break O' Day x Rouge de Marmande, has been increased.

Of the new hybrids developed for yield, and disease resistance, the most promising were Kokomo x Rouge de Marmande, Day Dream x Break O' Day, Early Pak x Pan America and Kokomo x Urbana.

Lines of (Rouge de Marmande) x L. Pimpinellifolium A160 back crossed were tested for *Fusarium* wilt resistance in the glasshouse and in the field. Hybrids derived in the main from leaf mould resistant parents and resistant varieties were tested at Mona Vale. Break O' Day x Rouge de Marmande was the most promising for unheated glasshouses.

At Yanco Experiment Farm.—500 seedlings of the cross (V.R. Moscow x Pan America) F3 were tested for *Fusarium* and *Verticillium* wilt resistance in the glasshouse and promising selections were made. The most promising crosses in advanced generations were M84-4-B-F6 and No. 62-F6 from the C.S.I.R.O., Merbein.

TOMATO INTRODUCTIONS

The most promising of the introductions were Wiltmaster, Ohio Crack Resistant, and Roma, all from the U.S.A.; and Q5 from Queensland.

TOMATO VARIETY TRIALS

Canning Variety Trial at Yanco.—In a replicated trial at Yanco Experiment Farm, Red Top, Carlton x Florida, Roma 886, Bush, Jefferson, Selection No. 255, No. 1 and 2—M3 were comparable with Tatura Dwarf Globe in canning quality.

Red Top out-yielded all other varieties and Carlton x Florida, M3-No. 1 Selection and No. 255—No. 1 selection gave higher yields than the standard Tatura Dwarf Globe.

Selections No. 255, 308-3Y52/20/82 No. 1, No. 2 and No. 3 proved to be the most resistant to *Fusarium* wilt.

Canning Variety Trial at Bathurst.—At Bathurst Experiment Farm, Urbana, followed by the hybrid Valiant x Grosse Lisse, gave the highest yield. Urbana also proved to be the most suitable variety for canning.

Beans

BEAN BREEDING

Breeding for disease resistant varieties of high yield and of type suitable for market and processing continued at Hawkesbury Agricultural College and Yanco Experiment Farm.

Anthraxnose Resistance.—At Hawkesbury Agricultural College, three lines of Fullgreen x Brown Beauty (No. 6, No. 14 and No. 18) have out-yielded Brown Beauty by from 25 per cent. to 35 per cent. and are of excellent quality. They are resistant to Anthraxnose Race 2 and have a good field tolerance to American Common Blight.

Fixed lines of Hawkesbury Wonder x Granda have given promising results for the last three seasons; No. 26 gave particularly heavy yields in trials on the north and the south

coast. Line No. 42 of the cross Hawkesbury Wonder x Tweed Wonder out-yielded both parents and produced pods of better quality.

Testing for resistance to Anthracnose was continued. Thirty-two varieties and twelve crossbred lines were tested for resistance to both races in the glasshouse. Two promising field bean types, Brown Beauty x Little Navy and Granda x Little Navy, developed for disease resistance and upright growing plant characteristics, were tested under field conditions. Satisfactory yields were obtained but seed size was rather large for canning use.

Breeding for Canning.—At Yanco Experiment Farm, breeding was carried on to develop white seeded bush types suitable for canning. Dwarf stringless types were crossed with the pole variety—Blue Lake FM-1—and tested in early generations.

BEAN INTRODUCTIONS

The best of the introductions were Corneli 14, Supergreen, Long Green, and King Green, all from the U.S.A.

BEAN SEED PRODUCTION

French Bean Certification Scheme.—It continued under favourable conditions, and good yields were obtained. The areas entered for certification totalled 815 acres, compared to 690 acres in 1956-57; and 686 acres were certified, compared to 585 acres in 1956-57.

The acreage certified included Brown Beauty (530 acres), Hawkesbury Wonder (52), Wellington Wonder (32), Windsor Longpod (29), Tweed Wonder (25), Clarendon Wonder (7), Goward's Special (4), Richmond Wonder (1), Tendergreen (2), Processor (3), and Seminole (1 acre).

Revenue from fees for 1957-58 is expected to be well ahead of the 1956-57 figure as the estimated yield is 6,500 bushels. Revenue from fees, including field inspections and sealing, was £1,820 in 1956-57, compared to £632 in 1955-56.

Inland Seed Production Demonstrations.—Due to an Australia-wide shortage of bean seed, Agricultural Extension Grant Demonstrations were undertaken inland at Mudgee and Pallamallawa to show that seed could be satisfactorily grown in dry inland districts. At Mudgee, the nett return to the grower was over £100 per acre. At Pallamallawa, the demonstrations were considered to be highly satisfactory in spite of a late sowing. Excellent quality seed was produced.

The severe shortage of bean seed has been overcome, and it is no longer necessary to encourage the industry inland.

Field Bean Demonstrations in the M.I.A.—Following heavy losses in horticultural crops in the M.I.A. after the floods of 1955, new types of production were sought. Agricultural Extension Grant Demonstrations with field beans were laid down in 1956-57. They were successful despite an abnormal season. In the 1957-58 season areas totalling 70 acres were grown, and more than 60 acres were highly successful. The average yield over the 60 acres was approximately 20 bushels per acre; almost double the average in New England areas.

Field beans could become an important crop in the M.I.A.

Garden Peas

Breeding.—Breeding of improved varieties of peas for market and processing continued at Hawkesbury Agricultural College and Yanco Experiment Farm.

Selections from Early Wonder x Greenfeast, Early Wonder x Canner 75 and Super Alaska No. 30 x Greenfeast were again promising for yield, quality, and evenness of maturity, at Hawkesbury College.

At Yanco Experiment Farm the most promising lines were selections from Greenfeast x Massey, Greenfeast x Clucas Early Dwarf, and Greenfeast x Wando.

Introductions.—The most promising of the introductions were Early Onward from England; "No. 40", Miragreen, "No. 702", Hyalite, and Perfected Freezer from the U.S.A.

Canning Pea Variety Trial.—In a replicated trial of canning varieties at Yanco Experiment Farm, Hursthouse, Mosaic Resistant, Bonnaville, Dark Seeded Perfection, Witham Wonder and Green Crop gave a significantly higher yield than the two commercial canning varieties L99 and Canner 75.

In the canned product, Hursthouse, Mosaic Resistant, Dark Seeded Perfection, and Witham Wonder were within the same quality range as Canner's 75 and L99.

Dark Seeded Perfection and Hursthouse will be further considered. Both are superior yielders and when canned their result is equal to or better than L99 and Canner's 75.

Demonstrations in North West.—In an Agricultural Extension Grant Demonstration at Pallamallawa a per acre yield of 6 bushels of good quality peas was harvested. The grower was quite satisfied with this result, in a drought year. Control of the pod caterpillar by D.D.T., and improved cultural and harvest methods would ensure him profitable pea seed production in a normal season.

Rockmelons

Promising Cross-bred.—Lines of the cross P.M.R. 45 x Rio Sweet were glasshouse grown and tested for resistance to Powdery Mildew. The best of them were field tested; and selections made for earliness, fruit quality and yield. All selections with the exception of Line 13/8 showed high resistance to Powdery Mildew when further tested in the glasshouse.

Fusarium Wilt Resistance.—Early in the season, rockmelon seedlings at Griffith in the M.I.A. were severely attacked by *Fusarium* wilt. The wilt resistant variety Delicious 51, although heavy yielding, proved unsuitable for commercial production due to large size and poor quality. The wilt resistant Sparton Rock was introduced for testing during the coming season.

Fruit Setting Hormones.—Trials on rockmelons at Griffith, indicated that a week earlier ripening of fruit can be expected from treatments with Duraset 40.

Carrots

SEED INVESTIGATIONS

Systemic Insecticides.—To determine the value of applying insecticides to seed crops, Systox was applied. Applied at monthly and fortnightly intervals produced the heaviest seed yields, but germination percentages were low.

In further trials, the plots treated with Systox are showing the benefit of the sprays. They are more vigorous in growth than the plots treated with nicotine and untreated plots.

Crucifers

Cabbage Introductions.—Brunswick from Denmark, Penn Valley and Ferry Morse from the U.S.A., Louco from Brazil, and Best of All from New Zealand are the most promising at present.

Cauliflower Introductions.—Selandia and Snowdrift from Denmark are the best.

Sprouting Broccoli Introductions.—Grand Central and Texas 107 from the U.S.A. stand out.

Onions

Good New Hybrid.—A new hybrid produced at Hawkesbury College from the cross Granex A (Sterile) x Hunter River Early Brown was very promising. It produces onions of better shape and keeping quality than Granex Hybrid.

Introductions.—The most promising introductions were Early Crystal No. 281 and Prizetaker from the United States.

Cucurbits

Cucumber Introductions.—The best tested were Packer, Stono, Ashley and Smoothie from the U.S.A.

Watermelon Introduction.—At Hawkesbury College and Yanco Experiment Farm the most promising Watermelon was Blue Ribbon Striped Klondike from the U.S.A.

Squash Introductions.—Black Beauty Squash displayed good prospects at Hawkesbury College.

Lettuce

Lettuce Introductions.—At Yanco Experiment Farm, Great Lakes 366, from the U.S.A., was outstanding.

Demonstrations with Soil Blocks

A soil block making machine was imported under the Agricultural Extension Grant to demonstrate the many advantages of establishing by this method crops normally propagated in seed beds and transplanted. The machine was publicised and many enquiries were received by the Department.

Requests for demonstrations were received from the Murrumbidgee Irrigation Areas and New England.

So far this equipment has indicated the potential of soil blocks in vegetable propagation. Many problems, including the determination of suitable composts for various districts, have to be resolved.

Wheat

THE SEASON

The ineffective summer rains and lack of autumn and winter falls resulted in one of the driest years in the history of N.S.W., after one of the wettest seasons for many years. In many areas rainfall was less than half of normal. The conditions, the driest in N.S.W. since 1944, were responsible for the complete failure of many cereal crops and reduced grain yields of areas allowed to mature.

PRODUCTION STATISTICS

The wheat grain harvest was the lightest since 1919-20 when only 4,387,000 bushels were produced. Total receipts by the Australian Wheat Board from the N.S.W. harvest approximated 4,100,000 bushels. Wheat retained by farmers for seed and stock feed would mount the total to the Department's estimate of 10,000,000 bushels.

Of the grain receipts by the Wheat Board, approximately one-quarter commanded a premium. As at 31st May, 1958, 1,108,655 bushels had been delivered to agents for an average premium of 2s. 8.8d. per bushel.

Premium varieties most in demand were Gabo, Koda, Sabre, Festival and Spica in that order. The premium for a lot of Saga (8s. 0d. per bushel) was a record for N.S.W. wheat.

'FAIR AVERAGE QUALITY' STANDARD

At the official fixing of the 1957-58 F.A.Q. standard for N.S.W., one F.A.Q.—for bulk only—was declared; at 64½ lb. per bushel Schopper weight. This compared with the declared F.A.Q. for the previous year, of 64½ lb. northern and 64½ lb. for southern and western. The F.A.Q. sample was very bright, attractive and clean.

VARIETY POPULARITIES

Gabo Leads.—The N.S.W. bred variety Gabo established itself as the most widely grown wheat in Australia. In N.S.W. in 1956-57, Bencubbin lost to Gabo the leading place in popularity which it had held unchallenged for 17 years. The leading varieties in N.S.W. are now Gabo (24.4 per cent.) of the acreage, Bencubbin (22.1 per cent.), Glenwari (11.1 per cent.), Kendee (5.2 per cent.), and Festival (3.5 per cent.).

Festival's Quality.—The rust resistant Festival, bred by this Department, was again the outstanding variety for bench characteristics in the Strong Wheat Classes at the 1958 Royal Show, Sydney. An entry of Festival gained Commonwealth Championship honours in the Strong Wheat Class, and another Festival entry scored highest points for bushel weight (70 lb. per bushel).

DURUM WHEAT

Co-operative Programme, with University of Sydney.—Breeding further durum varieties has been restricted until the industry has assessed the commercial potential of durum wheat. Dural appears to be reasonably well suited to the area and to trade requirements. To improve its rust resistance, crosses between Dural and highly resistant overseas varieties have been made.

Yield Trial of American Varieties.—This failed to give results because of dry conditions. However, these introductions did seem too late maturing to be valuable commercially in N.S.W. Moreover, observations on a hundred selected durums from the U.S.A. World Collection do not support the opinion that durums have a valuable drought resistance.

Durum Acreage.—In N.S.W. about 1,000 acres of Dural were sown. Yields varied from 13 bags per acre to complete failure. A major increase in acreage is not anticipated in 1958.

Winter Type Durum.—The possibilities of evolving this are being seriously considered; and earlier maturity than in Dural is being sought in recent introductions from the World Collections.

Milling Firm Ensures Seed.—A notable development in relation to durum wheat production is the action taken by a milling firm to ensure that Dural seed is available to farmers for 1959 sowings.

WINTER WHEAT

Grazing and Yield Trials.—The winter wheat trials at Tamworth Agricultural Experiment Station in 1957, were sown in late February. Throughout the season they illustrated the high potential of this type of wheat for the area.

Despite three successive grazings, the plots produced a grain crop comparable with the best in the district. The superiority of both Winglen (named during the year) and Winter Minflow over oats as a grazing crop in this locality was demonstrated in 1957; but in 1958 oats have so far provided a greater bulk of early feed.

Winter Wheat Selections.—A further 150 lines of winter wheats were selected for increase and detailed testing, in the Department of Agriculture—University of Sydney programme. Emphasis has been placed on disease reaction, particularly to rust, on grazing ability and palatability.

Seed Increase, Winglen.—Seed increase of the variety Winglen suffered severely in the drought. Sixty acres at Spring Ridge and ten acres at Narrabri were a complete failure. Yields at other centres were light.

Winglen in re Rust.—Winglen, selected to combine the resistance of Charter and Celebration, has given good field resistance to rust in the past; but in 1957 it was classified as susceptible to strain 21-2. This is by far the most prevalent strain in northern N.S.W. Thus work is being intensified to incorporate more resistance into Winglen.

BISCUIT WHEATS

The Department again co-operated with a leading biscuit manufacturer in testing a number of wheats in the south, for biscuit making. The Tasmanian variety, Macquarie, was included in the 1957 trials. It is being further tested in 1958.

WHEAT IMPROVEMENT PROGRAMME

In the South of the State.—The 1957 improvement programme conducted by the Wagga Agricultural Research Institute was handicapped by the extremely dry season. The Institute's section occurs later in this report of the Department.

Accent was on improvement in baking quality of wheats produced in southern N.S.W., and on wheat disease problems.

The earlier findings in respect of starch damage were confirmed but no progress is reported in devising satisfactory small-scale assessment techniques. These are an urgent need in breeding for quality. The findings have deleted from further trial some agronomically promising crossbreds which were approaching the release stage. Crossbreds so rejected include K.B.F.B. x P4 x B (C15500); R.D.R. x 4 Ridley 48, Pusa 4 x Waratah x Nabawa (C12780); Scimitar x Kenya x Bobin (RAC 170); and Morley x S.H.J. x Dundee x Nabawa (C15422).

Promising Crossbred R.D.R. x 4 Insignia 49.—This has reached a stage near to recommendation in some southern N.S.W. zones as a replacement for Insignia and Koala. It has resistance to bunt, flag smut and Gabo type stem rust, and desirable field and yield characteristics. The Institute classifies it as superior to Bencubbin, Glenwari and Koala in quality.

In the North of the State.—The co-operative work by the University of Sydney and this Department in breeding and testing improved varieties continued. For the first time since 1946, field crop and plot sowings in a large part of the north-west experienced harsh drought conditions. The plots at Curlew, Spring Ridge and Narrabri completely failed in 1957. Yield results at Tamworth were badly affected.

Back-crossing Programme for Rust Resistance.—The spring wheat breeding work directed by the University of Sydney had several setbacks due to new strains of the leaf and stem rust organisms. Several sources of resistance were available at the commencement of this work but only three readily usable resistances are now effective against all Australian strains of stem rust. These are Hofed, Khapstein and Kenya 117A.

Back-cross lines with one or other of these resistances are now available with the genetic background of Gabo, Koda, Kendee or Eureka. Crosses were made in 1957 to combine in a single variety the resistance of Kenya 117A and that of Timvera which is effective against most strains. The prospects are encouraging.

In addition to backcrossing to combine resistances, consideration is being given to this method in the multiline concept of combating the damage from rust.

Inter Species Hybrids for Rust Resistance.—Several studies the University of Sydney are dealing with the transference genes for rust resistance from *Agropyron* and *Aegilops* spp. common wheat.

New interspecific spring wheat lines with rust resistance from eladi 116 (*T. durum*) are now available as parents for further breeding work. Other durum varieties more resistant than eladi 116 and selected from the 1954 International Rust Nursery are also being used.

Back-crosses to Robin 39 and Steinwedel 199 and selections for both leaf and stemrust resistance have been made but the resistance has not yet been stabilised in 42 chromosome types.

The northern programme also continued in connection with inter wheats and durums, as reported in earlier paragraphs.

WHEAT QUALITY TECHNICAL COMMITTEES

Fact Finding.—A Technical Committee on Wheat Quality was set up after the 1956 Commonwealth Wheat Quality Conference, to collect and collate from each State facts relative to present and potential wheat quality. The fact finding duties were completed in 1957. The Special Agronomist (Cereals) was N.S.W. representative in this Committee.

A detailed report as affecting N.S.W. was presented to the August, 1957, meeting. In September, 1957, the Commonwealth-wide interim report was available to a separate Marketing Committee. This has since met to consider the application of suggestions made by the Technical Committee.

Set Quality Levels.—In the north of N.S.W., the variety Gabo has been set as the desired main standard of quality in the breeding programme. In the south, breeding work for the time being is aimed at the Javelin level of quality and, in the long range, the Gabo level.

Milling and Baking Tests.—These were carried out on numerous grain samples from the north and south. They included some promising new varieties as yet unnamed; as well as named varieties for which further quality information is desired.

NEW LEGISLATION AFFECTING WHEAT INDUSTRY

Wheat Industry Stabilisation Act, Amended.—Because of greatly reduced 1957 production from N.S.W. the Wheat Industry Stabilisation Act, 1954, was amended to permit the home consumption price in N.S.W. to be loaded with the cost of importing wheat from overseas and from elsewhere within the Commonwealth. The loading applies only to wheat sold during the twelve months which commenced 1st December, 1957.

Wheat Tax Act, 1957.—A tax of a farthing a bushel on wheat delivered by growers to the Australian Wheat Board was assented to on 30th May, 1957.

Wheat Research Act, 1957.—Associated with the Wheat Tax Act, 1957, this one provides that the tax receipts shall be used for research associated with wheat.

A Wheat Industry Research Council and a State Wheat Industry Research Committee have been set up to handle distribution of the funds. Some have now been allocated.

Grant to Agricultural Research Institute, Wagga.—The first grants approved by the Wheat Industry Research Committee of N.S.W., announced in April, 1958 totalled £19,000. The Agricultural Research Institute of this Department at Wagga has been allotted £9,250.

Prospective Grants for Wheat Research.—Further grants will occur as a result of the Australian Agricultural Council's decision in February, 1958, to distribute funds remaining from wartime wheat pools. The N.S.W. share will be £100,930.

WHEAT VARIETY TRIALS

Variety trials at Experiment Farms and on farmers' experimental plots continued. Extremely dry conditions reduced yields and the number of trials harvested. However, the results that were obtained gave a good indication of the drought resistance of varieties. In northern areas, Gabo, Saga, Koda and Broughton were the best of the varieties under test. In central and southern areas, good yields were obtained from Bencubbin, Sherpa, Insignia, Olympic, Gabo and R.D.R. x 4 Insignia 49.

Arrangements were made for variety trials with fifty-eight farmers in seventeen agronomists' districts; testing nineteen varieties in the south and twenty-five varieties in the north.

For the 1958-59 crop season arrangements have been made for variety trials with fifty-five farmers in twenty-three agronomists' districts; testing twenty-one varieties in the south and twenty-two varieties in the north.

SOIL FERTILITY AND ROTATION EXPERIMENTS

Condobolin Experiment.—Useful information was obtained from the large-scale soil fertility and rotation experiment initiated at Condobolin Experiment Farm in 1956, although cereal yields were light due to adverse conditions. Soil, grain and pasture samples from the experiment were tested. The experiment will continue for some years.

Cropping after Pasture Phase.—Experiments dealing with the cropping of land after a pasture phase and the use of fertilisers were continued.

Utilisation of Stubble.—An experiment concerned with methods of utilising stubble has been redesigned.

Cereal yields were very light from the 1957 harvest. This, following the excessively wet 1956 season, resulted in less information than was expected from the experiments.

FIELD WHEAT COMPETITIONS

R.A.S. Competitions.—Divisional Championships conducted by the Royal Agricultural Society were judged by officers of this Department. Crops were entered in twenty-three local competitions compared to forty-one the previous year. District agronomists did not judge the local competition. A highlight of the competition entries was exhibitors' interest in newer quality wheats, and in particular rust resistant wheats.

Junior Farmer Wheat and Oat State Championships.—Entries were fewer than usual. Only six Junior Farmers, from four clubs, took part in the State-wide wheat growing project. In the oat growing project there was only one competitor. Best wheat entry was a crop of Glenwari from Quirindi, yielding 40 bushels per acre. The sole oat entry was an outstanding crop of Algerian at Mudgee; estimated to yield 70 bushels per acre.

PURE WHEAT, OAT AND BARLEY SEED PRODUCTION

Seed supplies of recommended and promising varieties of wheat, oats and barley were maintained, and distributed through registered seed growers, despite the drought and light harvest. This was largely attributable to the recently initiated plan whereby surplus seed is carried over from season to season to guard against such eventualities as reduction of the current crop due to drought or disease.

To compensate for the light 1957 harvest, larger sowings for the production of Foundation Seed were made in 1958. These include 320 acres of wheat, 195 acres of oats, 21 acres of barley and 8 acres of cereal rye on eight Experiment Farms and Stations. The foundation sowings of recommended and promising varieties comprise 29 wheat, 22 oat, 5 barley and 2 rye varieties.

Associated with the production of Foundation Seed, initial selection and preliminary increase of wheat and oats was carried out at Temora Experiment Farm, and, of some oat varieties suitable for the northern tablelands, at New England Experiment Farm.

In 1957 and 1958, comparable figures for the latter in parenthesis, 102 (111) Registered Seed Wheat growers, working under the supervision of 18 (20) district agronomists, undertook seed increase of 15 (17) varieties; 88 (96) Registered Seed Oat growers, working under the supervision of 20 (22) district agronomists, carried out seed increase of 11 (12) oat varieties; and 5 (8) Registered Seed Barley growers in 4 (6) district agronomists' areas undertook pure seed production of 4 varieties.

Conditions of the Registered Seed Production Scheme have been reviewed. The revised Scheme will operate after the 1958 harvest.

Oats

Production Statistics.—Actual yield figures are not yet available, but the Division of Marketing and Agricultural Economics on 2 December, 1957, forecast that as a result of the extremely dry year and because many crops were grazed right out, the state's oat grain crop would be in the vicinity of only 3,000,000 bushels. This would be less than half of the previous season's production.

The yield was expected from about 275,000 acres, for an average of 10.9 bushels per acre.

Hay production was expected to be about 90,000 tons from 100,000 acres; 0.9 tons per acre.

Sowings for all purposes in 1957 aggregated 1,000,000 acres. In the previous year the total sown area was 766,000 acres; 6,274,000 bushels of grain were stripped from 420,500 acres, and 52,500 tons of hay were gained from 460,00 acres.

Variety Popularities.—A census of oat varieties has not been taken since 1954, but one is being taken in respect of 1957. The results will be available late in 1958. Meanwhile, it is thought that the new varieties Dale, Ballidu and Orient will show a significant increase compared to the 1954 position.

Oat Variety Trials.—In 1957, in addition to trials on Experiment Farms, oat variety trials were conducted in collaboration with twenty-seven farmers in fifteen agronomists' districts, testing fifteen varieties. For the 1958-59 crop season arrangements have been made for oat variety trials with thirty-six farmers in twenty-three agronomists' districts, testing twenty varieties.

Many trials sown last season were failures due to the drought. In the trials that were harvested, Orient, Algerian, Ballidu, Fulmark, Avon and Belar yielded well.

OAT IMPROVEMENT WORK

The northern and coastal oat improvement programme was carried on with New England Experiment Farm as the centre. Tamworth Experiment Station was used as a yield testing base in 1957 for the north-western slopes.

Replicated Uniform Yield Nursery.—At Tamworth sixteen lines and standard varieties, as well as a pilot trial of twenty-eight Garry crossbreds in F6 generation were in this yield nursery.

Grain Trials.—At Tamworth, Osage gave the best early grazing cuts and yielded also well for grain, whilst V.R. Bke. F. x W.F. gave the heaviest grain yield. Those of the Garry crossbreds which out-yielded the Fulghum check plots have been sown in replicated U.Y.Ns. in 1958 and promising lines will be later seed increased. Associated with the Tamworth programme, promising material was sown at Curlewish with the co-operation of the Waterhouse Plant Breeding Station and in farmers' experiments on the northern tablelands and north-west slopes in conjunction with district agronomists.

Crown Rust Selection.—This work, recommended in 1956, was continued in 1957 at Grafton Experiment Farm. Bulkied, unselected early generations were hand sown and single crown rust resistant plants were selected.

Crosses, in Glasshouse and Field.—At New England Experiment Farm stem rust resistant lines received from the University of Sydney were used for crossing as rust resistant parents. Seed of these lines were also made available to Wagga Agricultural Research Institute for the southern oat work. Neither stem rust nor smut appeared at Glen Innes, but valuable notes were made on the apparent drought resistance of crossbreds and varieties.

Grazing Cuts versus Eye Estimates.—The grazing cuts showed that eye estimates are unreliable. Fulghum, with its medium broad leaves, was eye-judged a better yielder than Algerian at Tamworth, yet much heavier grazing cuts were taken from Algerian. Amongst the highest yielding varieties in the trial at Tamworth, however, were Osage, Fulmark and Avon (all wide-leaved) and V.R. Bke. F x W.F. (narrow-leaved). At Glen Innes, the grazing cuts were dehydrated, but unfortunately no dehydrator was available for this work at Tamworth. The importance of this is that the total dry matter produced per acre determines the grazing value.

Dry Matter Percentages.—Percentage of dry matter varied between the different varieties; possibly due to different stages of vegetative growth, although capacity to withstand frost and drought may also be linked with dry matter content. On the other hand, dirt adheres more to prostrate varieties. Algerian had the highest dry matter content, 27 per cent. compared to Belar 20 per cent.

Strains of Algerian Tested.—Of three at Glen Innes, one has been outstanding during the past three years for grazing hay and grain. After next harvest only the best strain may be retained.

Southern Improvement Programme.—This programme, under direction of the Wagga Agricultural Research Institute, was seriously handicapped by the drought conditions at Temora. Some trials were not sown. Others were not worth harvesting. Orient, V.R. Bke. V. x W.F. (W4465) and Coker Fulgrain performed well under the harsh conditions, and Yate Algerian was outstanding in providing early grazing.

Grain Selection an Additional Aid.—In the overall improvement programme at Temora Experiment Farm during 1957 single plant selections could be reduced by 25 per cent. by discarding those with the poorest grain characteristics. With this information, the method of presentation of variety sowing recommendations has been revised. This will assist farmers to select varieties according to the end purpose required, e.g. grazing, grazing and grain, or grain.

Barley

Production Statistics.—These are not yet finalised but the area harvested for grain would be the lightest for some years. In 1956-57, 52,000 acres were sown for all purposes, and 44,000 acres returned a grain yield of 781,000 bushels. In the last normal season, 1955-56, 65,000 acres were sown for all purposes, and 54,000 acres gave a grain yield of 1,120,000 bushels.

Comparative Fodder Trials.—Comparisons of barley, oats and wheat at New England Experiment Farm have now ended. The results are being collated.

Rye

Production Statistics.—These are not yet finalised. Many rye crops were subjected to heavy grazing, and although the acreage sown in 1957 was greater than in the previous year, the total grain production would be lighter than in 1956.

In 1956-57, of 15,035 acres sown for all purposes, 3,556 acres were harvested for a grain yield of 26,680 bushels. For comparison, the highest recorded production of rye grain in N.S.W. was in 1939-40 when 12,196 acres were harvested for a grain yield of 193,890 bushels.

Increased Demand.—Demand for locally grown cereal rye grain has risen markedly in recent years due, in large measure, to the influx of new Australians.

Seed Stocks of Strains.—Seed stocks of the Weethalle strain have been maintained, and in 1958 a small increase area of Strain 8 was sown.

Maize

The season generally was satisfactory. Adverse weather and a devastating attack by black beetles on the north coast seriously affected early sown crops, while *Monolepta* beetle and virus disease "Wallaby Ear" affected later sowings, but some 47,000 acres were harvested for grain, with satisfactory yields.

Big Acreage of Hybrids.—About 75 per cent. of the acreage was sown with hybrid seed. A record yield, estimated at 195 bushels to the acre, was produced by a south coast grower using the most recently released Departmental bred hybrid from Grafton Experiment Farm.

HYBRID MAIZE IMPROVEMENT WORK

Hybrid Maize improvement work was continued at the Grafton and New England Experiment Farms. Results obtained at both were satisfactory.

New Virus Disease, 'Wallaby Ear'.—This affected the growth of some material at the Grafton Farm. It is the first time that 'Wallaby Ear' has caused concern in this State. The chance was taken to note susceptibility of some breeding material which will be of value if the disease tends to become prevalent.

Male Sterility Programme.—This, at Grafton Experiment Farm, progressed satisfactorily.

Leaf Blight Resistance Work.—A temporary check in this important project was caused by the resignation of the maize breeder late in the year.

DISTRICT TRIALS

Grain and Fodder Trials.—Fifty trials for grain production and six for fodder production proceeded. Good results are expected from a large percentage of them.

Field Testing Early Maturing Hybrids.—On the Northern and Southern Tablelands these tests have created a lot of interest. Shortage of seed prevented large scale trials of a very promising short season hybrid bred at the New England Experiment Farm. Action was taken to speed up the seed supply for next season's tests.

HYBRID MAIZE FOUNDATION SEED PROGRAMME

Inbred Seed.—An important phase of the hybrid foundation seed production programme work is the Department's production and maintenance of inbred seed material. This is supplied to co-operatives and individual farmers for production of foundation seed under the Hybrid Maize Seed Certification Scheme.

HYBRID MAIZE CERTIFIED SEED PROGRAMME

Ample Supplies.—At least 20,000 bushels of hybrid maize seed will be certified this year compared to 14,000 bushels from the previous season. The carry-over from the previous season was about 3,000 bushels. Ample supplies of most varieties will be available for sowing during 1958-59.

N.S.W. Hybrids Popular Interstate.—N.S.W. hybrids' popularity in other states, particularly in Victoria and Queensland, is increasing. One seed company in N.S.W. has contracted to produce certified seed in Queensland. The entire crop of hybrid maize seed grown on the far south coast has been bought and cleaned by a seed merchant in Victoria.

MAIZE INVESTIGATIONS

Miscellaneous Experiments.—Trials concerning fertiliser application, sowing methods, seed treatment and the residual effect of insecticides, were continued.

Red Clover-Maize Rotation Experiment.—This has been carried out at the New England Experiment Farm over a long period of years. It is continuing.

Maize Introductions.—Introduction of maize material from overseas continued. Satisfactory results have followed from their sowing in the quarantine area at Leeton Experiment Farm.

Sweet Corn

Inbreds, and Foundation Seed.—Work on this crop was carried out at the Yanco Experiment Farm. The activities were confined to maintenance of inbred lines and production of foundation seed.

A successful yield test was conducted in the Yanco district.

U.S.A. Hybrid, Iochief.—This continued to be a popular winning variety in N.S.W., but firms processing whole kernels declined to favour Golden Cross Bantam.

Certified Hybrid Sweet Corn.—The season was satisfactory and the quantity of seed certified will be much in excess of the 50 bushels from the 1956-57 crop.

Popcorn

Hybrid Popcorn Breeding Programme.—This continued at New England Experiment Farm.

Commercial crops performed very satisfactorily, but the demand for commercially grown popcorn is limited. Therefore the work at New England Experiment Farm will be confined to testing introductions. This crop can be grown successfully on a large scale in some districts should the need arise.

Sweet Sorghum

Sweet Sorghum increased in importance throughout coastal areas and southern irrigation districts.

Varietal Improvement, and Foundation Seed.—Work continued at Grafton Experiment Farm and Hawkesbury Agricultural College in the improvement and Foundation Seed production of White African and Sacaline varieties. At Toruya, improvement of the variety Early Orange was undertaken in co-operation with a local grower.

Sweet Sorghum Seed Certification Scheme.—This is now on a satisfactory footing. During the year, nineteen growers produced 127 acres of sweet sorghum for seed certification, and at least 5,000 bushels will be certified. It is a record, and contrast to the 2,000 bushels produced in the previous year.

Promising Introductions.—Seed of some to be field tested in 1958-59 was produced at Grafton Experiment Farm.

Grain Sorghum

Activities associated with this crop continued at the Yanco and Leeton Experiment Farms.

Promising Introductions.—Testing and seed increase are being maintained. A substantial quantity of pure seed was harvested at both Farms for distribution to growers.

Variety Redbine 66 for Release.—This variety again performed well and will be released for commercial production. Caprock and Alpha are the most popular varieties in the state.

District Variety Trials.—Eight were carried out by district officers.

Seed Purity Attention.—A lot of attention has been given to this. The co-operation of a number of landowners in the north-west has been secured and the work has been initiated.

Hybrid, Grain Sorghum.—Apart from observations on introduction little was done. It is too early to forecast whether its future will follow a pattern similar to that of hybrid maize.

Millet

Improvement Work with Broom Millet.—This was maintained at Bathurst Experiment Farm.

Grafton Experiment Farm has produced seed of a promising strain for field testing.

At Maitland a grower assisted in the selection of a promising strain supplied during the 1956-57 season.

Fodder Millets' Grazing Comparisons.—Several trials comparing varieties were carried out. Japanese Millet in most cases proved superior. It is being widely used by farmers.

Sudan Grass

Sweet Sudan S.S.6.—S.S.6 Sweet Sudan Grass strain has maintained popularity and largely replaced Common Sudan Grass in N.S.W.

Seed Impurity.—Deterioration in purity of S.S.6 Sweet Sudan seed has caused concern. Some 2,000 acres were field inspected under the Approved Seed scheme and seemed acceptable. However, a lot of the seed is likely to be rejected after purity tests in the Seed Testing Laboratory.

Lahoma Sweet Sudan.—Another Sweet Sudan strain, Lahoma, from the U.S.A., has been seed increased. The seed will be available for testing in the coming season.

Columbus Grass (*Sorghum alnum*)

"Straw-coloured Seed" Strain.—Columbus Grass experiments continued at Grafton Experiment Farm, and were started also at Trangie Agricultural Experiment Station and Yanco Experiment Farm.

Progress was made in producing a strain giving a straw-coloured seed by which it may be distinguishable from Johnson Grass. Seed from selections carrying the straw-coloured seed have been distributed for seed increase in the coming season.

North-western Acreage Increase.—Considerable interest in Columbus Grass was evident throughout the north-west. Approximately 5,000 acres have been sown and the figures will increase rapidly. *Sorghum alnum* is still a prohibited seed under the Agricultural Seeds Act.

Rape and Kale

Variety Trials.—Eight trials of varieties of rape and kale were conducted. Publicity given to the trials at field days and through the press stimulated interest in these crops and increased areas have been sown by farmers.

Fodder Cane

Variety and Disease-Resistance Trials.—A collection of varieties was tested at the Grafton Experiment Farm.

Trials in the Kempsey district using superior new disease resistant types were continued.

Summer Legumes

Experiment Farm and District Trials.—At Grafton Experiment Farm work continued on soybeans, cowpeas, *Crotalaria* spp., velvet beans, mung beans, kudzu and other summer legumes. District trials were carried out on the central and north coast.

Sod Seeding Summer Legumes.—Interest in summer legumes increased because of the good results from sod-seeding on the far north coast.

Cowpea Seed Production.—Production of cowpea seed was undertaken in co-operation with two landowners in the north west, and it is now known that seed can be successfully produced in that region.

Cowpea Stem-rot Resistance.—*Phytophthora* stem rot again damaged commercial cowpea areas. Resistant varieties have been introduced from Queensland. They are being tested and seed increased at Grafton Experiment Farm.

Velvet Bean Seed Production.—Attention has been given to velvet bean seed production in the north-west because this crop has sod-seeding possibilities on the north coast.

Soybean Trials and Seed Production.—Trials for seed production were continued with promising introduced soybean lines at the New England and Grafton Experiment Farms.

Winter Legumes

Field Pea Trials.—These continued at the Grafton and New England Experiment Farms.

Vetch Trials.—Work with vetches was undertaken at the Grafton and Wollongbar Experiment Farms. District trials with vetches were conducted. There was renewed interest in vetches. The area sown to them in Lismore district increased from 1,000 acres in 1957 to 6,000 acres in 1958.

Stem-rot Resistant Vetches.—Stem rot in vetches caused trouble during the year. Material with disease resistance was introduced.

Vetch Seed Production.—Attention was given to seed production of vetches in north-western areas.

Lupin Variety Trials, and Seed Increase.—Lupin varieties are being tested at Hawkesbury Agricultural College. Some Sweet Lupin strains have shown promise. Seed increases will be undertaken to give these strains a more intensive trial.

Russian Comfrey

This fodder crop received widespread press publicity, a numerous enquiries were received. Work on it continued. Grafton Experiment Farm, and a small number of plants were established at other Experiment Farms. Observations were made also on numerous plantings by landowners.

Rice

Record Crop.—The most severe infestation of rice beet since the 1932 season occurred. Filling of some crops which flowered in late February, when abnormally cold nights were experienced, was poor. Even so, the rice harvest for the 1957-58 season was a record. One hundred and six thousand tons had been received by the end of June, 1958. The previous record was 95,252 tons in the 1954-55 season.

As well as a record total yield, the world record average yield of 2.54 tons per acre obtained in the M.I.A. in the 1954-55 season seems likely to be exceeded.

Total area harvested will finally be a little over 48,000 acres. In the Murrumbidgee Irrigation Areas and surrounding districts approximately 32,700 acres were under crop; some 4,800 acres less than in 1956-57, but in that season additional water was available following the previous very wet year. The rice area in the Murray Valley districts increased slightly. There, limited expansion is still occurring, but it is expected that the state acreage will stabilise around 50,000 acres.

New Trends.—Although the rice acreage has stabilised, the industry continues progressive. New trends are evident in the increasing use of aircraft, and the adoption of bulk handling methods for the harvest.

Aerial Top-dressing, Spraying, and Sowing.—For some years past several farmers have aerially applied fertiliser as a top dressing. Others are following suit.

One farmer in 1956-57 used aircraft to resow his rice area after losses due to bloodworms in the wet season. This season the same grower elected to sow by this method. His results were very promising.

An aircraft was used also in spraying 3,000 acres of rice in the Mirrool Area against rice beetle infestation. In the previous season a crop was sprayed with a desiccant, for easier and faster harvesting, but results were not promising. This may have been due to increased sunchecking.



Blue Mould Resistant Tobacco

At Bathurst Experiment Farm, Division of Plant Industry by selection after crossing the commercial tobacco variety Hicks with a native tobacco species *Nicotiana debneyi* has produced a variety which has excited the interest of tobacco processors whilst also it is resistant to Blue Mould (*Peronospora tabacina*). Blue Mould is the disease which has limited tobacco growing in Australia. At least three times in the past 10 years it has caused tobacco growers a loss in the vicinity of £1,000,000.

(Photo. from Bathurst Experiment Farm)

Bulk Handling at Harvest.—Harvesting trends have resulted in the adoption of bulk handling. This has been used whether the rice is harvested at normal moisture requirements of under 16.5 per cent. or at the higher moisture levels which entail subsequent drying. For the 1956-57 season a shed at Leeton was converted to hold 2,000 tons of paddy rice received by bulk delivery; the shed capacity was increased for the last season.

In 1957, a similar rice storage shed at Griffith was converted to hold 4,000 tons in bulk. Other storage facilities, smaller and of an experimental nature, are available at Yenda in the I.A. and at Burraboi in the southern area. These storages have led to a big increase in bulk handling of the rice harvest.

Production Problems—Cold, Rice Beetle, Bloodworms, High Soil Fertility.—Cold weather of late February, 1958, caused substantial individual losses. The increased population of rice beetles, though causing concern at the time, did not result in serious losses. Early control prevented a build up of the infestation. Similarly, bloodworms were again evident to some extent, but effective control measures were adopted early.

The most serious problem was the fertility "build-up" in and sown to rice after some years of pasture. Most of the crops which filled poorly because of cold weather at flowering are late, because of the high soil fertility.

This problem of late, flaggy crops has high priority for investigation when the Rice Laboratory at Yanco is functioning.

Research Facilities Developed.—The laboratory building at Yanco Experiment Farm has progressed a lot. A rice chemist is expected to take up duty before the new rice season, and a laboratory assistant already appointed for rice work will shortly take up duty there. In addition to the nutritional status of rice soils the major initial investigation will be to rice quality.

Sunchecking Research.—Rice investigations continued on Yanco and Leeton Experiment Farms and in four districts. On Yanco Farm, high priority was given to the problem of sunchecking.

This work entered its third year and was limited to detailed investigation of crops on five farms. The previous years' findings that rate of drying of the grain is the most important factor were corroborated.

Association between high soil nitrogen and excessive sunchecking was again apparent, emphasising the urgency for laboratory investigations.

Industry Financial Support of Sunchecking Research.—The sunchecking research was under the auspices of the Rice Investigations Subcommittee of the Irrigation Research and Extension Committee. This Subcommittee was formed when the activities of the former Rice Sunchecking Subcommittee were enlarged. The rice industry has continued to support the work financially. It provided £1,750 in 1957-58, in addition to £3,000 in the previous two years, and the Rice Marketing Board has provided £800 for the purchase of capital items.

Pure Seed Production, Seed Increase of Certain Varieties.—Production of Foundation Seed of Caloro 2 under the Pure Seed Scheme continued at Leeton Experiment Farm. Increasing infestation of rice lands with hairy millet (*Echinochloa crus-galli*) is causing concern. The Rice Marketing Board accordingly has been advised to install the most modern seed cleaning machinery.

Seed of other varieties is also being increased. Some 270 acres were sown to Calrose and yielded an average of three tons per acre. An extensive marketing survey for consumer reaction to this variety was conducted.

Late Caloro, popular in the early days of the industry, but which lost popularity owing to its lateness, was seed-increased. With modern harvesting and drying techniques, allowing high-moisture harvesting, there will be an increasing demand for this variety. Twelve acres were sown. The average yield was slightly more than four tons per acre.

The variety Hungarian created much interest in southern districts, particularly for its extreme earliness. Seed stocks have been increased, but release of the variety has been deferred pending commercial milling tests and consumer reaction to a limited sale of the milled product.

Irrigation and Drainage Modifications.—The industry trends towards high moisture harvesting and bulk handling make obvious the need to modify the accepted irrigation practice.

In anticipation of the calls for advice, an early drainage trial was conducted at Leeton Experiment Farm. A trial involving various methods of solar heating of irrigation water for weed control and better rice establishment was also carried out at that Farm. Both trials will continue, for conclusive results.

Rice Breeding and Improvement.—On Yanco Experiment Farm, rice breeding and improvement continued. New introductions were tested. A limited hybridisation programme was pursued. Yield and fertiliser trials were conducted. Pure line, mother seed of Caloro 2, Late Caloro, Colusa 180 and Calrose were grown.

Rice Rotation Experiment.—Summer weed infestation of the long pasture treatment again resulted in low rice yields, despite efforts to get better water control.

Variety and Fertiliser Trials.—These continued in the Wakool area. The value of the early Caloro strains and Colusa 180 compared to the standard midseason Caloro 2 were evident in this region.

Results in the fertiliser trial were not consistent, but there was an obvious response to nitrogen in the form of sulphate of ammonia.

Tobacco

N.S.W. tobacco acreage increased in 1957-58 to an estimated 1,450 acres, compared to 1,135 acres in the previous season; an increase by almost 28 per cent. Expansion of tobacco acreage in the north-west of the state is limited by suitable soils but the main factor is inadequacy of water supplies in the rivers of this border area.

Successful tobacco growing on the levee soils adjacent to the Darling River at Bourke was consolidated by the harvest of approximately 25 tons from 50 acres.

Average yields of tobacco in N.S.W. are about 900 lb. per acre, but could be increased by improved techniques.

Blue mould caused substantial losses in the Texas area late in the season.

Breeding Programme.—At Bathurst Experiment Farm the breeding programme aimed at overcoming the blue mould problem as well as improving the quality of tobacco leaf. Other objectives of the breeding programme are mentioned in subsequent paragraphs.

For the past two years the efforts have concentrated on breeding a blue mould resistant, flue-cured variety. Lines have been produced which resemble in the field the best commercial varieties. They show excellent field resistance to blue mould and have some seedling resistance.

Fertile hybrids between the *Nicotiana tabacum* variety Hicks and nine resistant species have also been produced.

Commercial testing of two of the promising blue mould resistant lines has been arranged. One line is a fixed hybrid derived from a *N. debneyi-tabacum* amphidiploid, having the pedigree F4 (Hicks) 2 x (Hicks x *N. debneyi-tabacum*). The other line is an F1 hybrid with the pedigree Hicks x Hicks x (Hicks x *N. debneyi-tabacum* x Hicks).

Work proceeded on a restricted scale in breeding for mosaic and nematode resistance, producing mammoth types and introducing Turkish aroma into flue cured varieties.

Mutants by High Frequency Radiation.—The use of high frequency radiations in attempting to produce mutants with blue mould resistance, and to break linkages between this resistance and unfavourable characteristics, was commenced.

Selections from Introductions.—Emphasis has been placed on varietal introductions. Over 400 lines were obtained in October, 1957, from the U.S.A., and were evaluated in respect of their blue mould resistance. Stocks of pure seed were maintained. A collection of strains of Hicks from the same source were tested and seed increased.

Field Trials.—Field trials continued on farmers' properties. They included seed bed fumigation, topping and suckering, and fertiliser trials.

Transfer from Bathurst to New England Experiment Farm.—Preparations have been made to transfer the tobacco research activities from Bathurst to New England Experiment Farm in July, 1958.

Tobacco Industry Trust Account.—Tobacco investigations have been greatly aided by funds from this account and the annual allocation of £8,000 from this fund was again made.

A new glasshouse has been erected at Glen Innes and laboratory facilities have been provided but some £8,000 of the money allocated for capital works still remains.

There has been great difficulty in attracting a suitable applicant for appointment to the position of tobacco plant pathologist.

Central Tobacco Advisory Committee.—The state is represented in this Committee. It has met regularly and has helped to engender further confidence in the tobacco industry by growers. Manufacturers and growers representatives have also met in conference, and agreements on marketing have dispelled much of the suspicion exhibited in the past.

Percentage of Australian Leaf in Products.—A change encouraging to growers occurred in the statutory percentages of Australian tobacco leaf to be used in manufactured products, to qualify for a rebate of custom duty. The Department of Customs and Excise re-examined the position in the light of stocks of tobacco and current usage. Consequently instead of 14½ per cent. and 22½ per cent. for cigarettes and manufactured tobacco respectively, the percentage was fixed at 15½ per cent. and 16½ per cent. respectively; to operate from 1st July, 1958.

Linseed

It was thought farmers would sow as much as 6,000 acres to linseed in 1957 but the sown area was very much less. Owing to the dry season only seed crops were harvested, and approximately 850 bushels will be available. The area harvested is estimated to have been as low as 200 acres.

During the 1958 autumn the Oil Crushers Association of Australia publicised a new marketing arrangement which stimulated many enquiries regarding linseed cultivation and seed supplies.

Breeding and Improvement Work.—These continued at Tamworth Agricultural Experiment Station, New England Experiment Farm, and in farmers' trials in the north-west. The dry season caused selection work to be limited to drought resistance. Rust and pasmo diseases were absent, even from susceptible varieties.

Breeding work included thirty crosses aimed at combining yield with pasmo tolerance, as well as selection within lines from crosses of the fourth generation.

Variety Trials.—At Tamworth Experiment Station and on farmers properties Queensland Walsh proved generally superior to the old Walsh variety; but Marine, the variety with high tolerance to the important pasmo disease, was in the top group for yield per acre.

Seed Increase of Selections.—Pending adequate testing and seed increase of pasmo-resistant lines of higher yielding capacity than Marine, three varieties with satisfactory yield records and rust resistance are being increased by co-operating

farmers to fill immediate, future needs. These varieties are Calar, Redwood and C1118; for early, mid, and late seed sowings respectively.

Other—Minor Crops

Tung Oil.—A new attempt to establish the tung oil industry was undertaken by Tung Oil Plantations Pty. Ltd. With plantation of 120 acres of trees up to five years old it is preparing at the plantation to extract oil. The industry been uneconomic in the past, because of prices, harvest difficulties, and distance from the processing plants. The local processing proposed may well give new life to a minor industry, and help to meet Australia's annual requirements. These are approximately 2,000 tons of tung oil.

Ramie.—Several experimental commercial areas were planted, with root-stock, on the north coast during summer 1958, and results were promising. Irrigation may be needed to overcome moisture shortage during the dry spring on the far north coast.

Production of planting material continued at Wollongong and Grafton Experiment Farms.

Cotton.—The unfavourable season discouraged farmers from growing cotton, but there were continuing enquiries from the north-west regarding the crop.

Peanuts.—No expansion occurred on the north coast. Interest continues, but production is governed by ruling prices on the Sydney market. Seed supplies were maintained at Grafton Experiment Farm.

Hops.—Bathurst Experiment Farm has previously shown the varieties suitable for hop production on the tablelands are available. Accordingly the work has been reduced to maintenance of stocks.

Other Oil and Fibre Crops.—The economy is not at present encouraging for the production of safflower, castor beans, sunflower, sesame and kenaf, but seed supplies are being maintained on Experiment Farms. The most important is safflower, and a co-operating farmer has provided adequate seed supplies of the most promising variety.

Irrigation

In the summer of 1957-58 the number of irrigation plants increased spectacularly due mainly to the preceding drought.



Linseed Improvement and Seed Increase continue at Tamworth Experiment Station

Enquiries from the south and central west, as well as from the north-west where in certain areas linseed was earlier grown successfully, have indicated increasing interest in this crop. Meanwhile the Department has continued its linseed improvement work and has Pasm-resistant lines ready for prospective growers.

(Photo from Tamworth Office.)

Likewise the inquiries from farmers in relation to irrigation increased, with emphasis on spray irrigation, pumping from streams, bores and wells. Many were concerned also with use of surface catchment, and a big increase occurred in water races constructed on farms.

Co-operation with officers of the Irrigation Commission was well maintained, in lectures at field days and at schools for farmers, and by advice to the Commission in regard to probable water utilization of crops in various parts of the State. Irrigation was featured at many local field days by district officers, as well as at farmers schools.

To meet the needs of the developing situation, the Department organised a refresher school at Yanco Experiment Farm for Departmental officers, at which they were given intensive courses in irrigation. A further school will be held, to cater for officers who were unable to attend the initial school.

A revised printing of the publication "Irrigation Farming" was received from the printer in August, 1957. Five thousand copies had been distributed by December, 1957.

IRRIGATION PROPOSALS

Murrumbidgee Valley.—Following the submission of a report to the Minister for Conservation by the Blowering Dam Investigation Committee, in which the Department of Agriculture is represented, Parliament authorised construction of a weir at Gogeldrie and construction of a main canal to supply water to the Coleambally irrigation area.

A number of meetings of the Committee considered further aspects of this irrigation area development, including the position of stud sheep properties, closer settlement, railway and transport facilities, and town development.

Hunter Valley.—The Abermusden Committee, in which this Department is also represented, completed its report to the Minister for Conservation in connection with the utilization of the waters to be stored when Glenbawn Dam is completed. The dam is close to completion, and is in fact now storing water.

Namoi Valley.—Originally it was intended that the Keepit Dam would be for the purpose of stabilising the flow in the Namoi River, because of the apparent decline in artesian water supply throughout much of the north-west. The artesian supply appears to have stabilised, with better control; and much of the waters to be stored by the dam will be available for irrigation.

On an area of land similar to the soil types on which irrigation will eventually be practised, this Department has established an Experiment Farm. Experiments to provide information on crop production under irrigation in the north-west will commence in the spring of 1958.

Macquarie Valley.—Burrendong Dam has been authorised for construction on the Macquarie River, and work is recommencing during 1958. The Committee appointed to report on the development of irrigation with the water has completed its report to the Minister for Conservation.

FLOOD MITIGATION

The Committee of Advice on Flood Control and Mitigation, in which this Department is represented, was appointed by Parliament after the 1955 floods. This year it met several times, and dealt with proposals for flood mitigation at Warren, Algett and Wagga.

The Hunter Valley Conservation Trust held monthly meetings and dealt with applications for subsidy under the soil conservation works programme of the Trust's duties. It also contributed to the programme of flood mitigation being carried out in the Hunter Valley by the Water Conservation and Irrigation Commission and the Public Works Department.

FARM WATER SUPPLIES

Under this Act, by arrangement the Water Conservation and Irrigation Commission refers to the Department of Agriculture, for examination, applications for advances for irrigation where the cost is estimated to exceed £1,000. This year, fifty-seven applications were received, compared to twenty-nine the previous year.

IRRIGATION RESEARCH

An agronomist has been appointed to undertake research work at Yanco Experiment Farm. The initial projects comprise a study of spray head patterns, aerial evaporation, loss of moisture, and an investigation to determine the optimum use of water for the growth of lucerne.

This is a beginning. It is hoped that further irrigation research appointments will be possible.

DIVISION OF HORTICULTURE

Regulatory

PLANT QUARANTINE

Importations of overseas plants and plant products were examined for the Commonwealth Department of Health in accordance with the Quarantine Act.

Seed.—The quantity of flower and vegetable seed imported was approximately the same as in 1956-57. Main consignments were from U.S.A., Holland and New Zealand, with smaller quantities from United Kingdom. Little trouble was found in them except that some consignments of carrot seed from New Zealand contained weed seed and needed recleaning before release. Other lines were fumigated for insect infestation. The usual large quantities of grass seed, clover seed, peas and lupins were imported from New Zealand. Many consignments of grass seeds were held for fumigation for insect infestation, or for recleaning because of weed seeds.

Nursery Stock.—The over-all quantity of nursery stock importations declined considerably, because the Nursery Stock Regulations are now applied to bulbs. Whereas some 4,000,000 were imported for the year ended June, 1957, only about 25,000 were imported this year.

Orchid plant numbers also decreased, while ornamental plants increased. Some consignments of ornamental plants were destroyed because of virus disease or root nematode. Others, after appropriate treatment, were planted in registered Quarantine Nurseries for growing under post-entry examination.

Importations, in summary, included 25,075 tubers, including bulbs, corms and rhizomes; 15,929 ornamental plants; 18,581 orchids; and 771 budwood scions or roses.

Passengers' Baggage.—Passengers' baggage from all passenger and migrant ships was inspected during the Customs examination. Prohibited and infected goods were detained in considerable quantity for destruction or treatment.

Parcels Post.—At the Parcels Post Office, parcels and packages from overseas which contained plants and plant material were inspected daily. In all, 10,473 parcels were submitted for inspection. Some 2,579, 25 per cent. of the total, were detained for further examination, treatment, or destruction, as the case required.

Timber.—Importation of timber, sawn and in log form, amounted to 174,000,000 super feet; an increase of 13,000,000 super feet over last year's importations.

Sawn timber amounted to 157,500,000 super feet. More than half of this was Douglas Fir from North America. The rest was mainly from New Zealand, Borneo, Indonesia and Malaya. No insect infestation was found in sawn timber; although much of the Douglas Fir from North America is being marked with more sapwood and "wane" edge than previously. This increases the risk of introducing infested timber.

Several consignments of log timber were infested with bark borer and treated under supervision before release.

Sirex Wasp.—All cargo discharged from overseas vessels was inspected for Sirex wasp or other wood-boring insect infestation in cases, crates, or timber used in the packing of cargo.

In the twelve months, some 6,650 cases, crates, and the like, were quarantined for treatment under supervision; mainly for Sirex wasp and Longicorn beetle infestation.

Inspection of Goods.—Seven hundred and sixty different shipments of cargo arrived at the port of Sydney in which a wide range of plant material requiring quarantine inspection was discharged. Some of the principal imports were copra, spices, seeds, peanuts, canning beans, cocoa and coffee beans, nuts, and bamboo ware. A considerable quantity of some of these goods were subject to treatment under supervision; by fumigation, heat treatment, recleaning or crushing, as the case required.

Wheat Offal Entry.—Six shipments of wheat offal, totalling 2,750 tons, were permitted to be imported into this State. Four were from South Africa, one from Egypt and one from France. The shipments from France and Egypt, and one from South Africa, amounting to 1,991 tons in all, were heavily infested with the Rust Red flour beetle. They were fumigated with methyl bromide under plastic sheets.

Canadian Wheat Entry.—On the failure of the wheat crop in this State, the Commonwealth permitted the import of a quantity of Canadian wheat. Three shipments, about 30,500 tons, were discharged. Strict supervision was maintained during unloading to ensure that all spillage was collected and processed or destroyed. All flour mills which received an allocation are in the metropolitan area. Regular supervision is being maintained at these mills to safeguard against the chance of any of this cereal or of weed seed leaving the mills in a viable form.

EXPORT INSPECTIONS

Exports of fresh fruits, flour and rice were inspected under the provisions of the Commerce (Trade Descriptions) Act.

Citrus Fruits.—Nine thousand two hundred and eighty-five bushel cases of Navel oranges were exported. Of these, 8,485 cases were shipped to New Zealand, all of which were grown and packed in the Griffith district. The rest, 800 cases, was shipped to Singapore. The fruit was packed in Australian dump cases and was of excellent quality until the last shipment, in August, 1957, when slight evidence of frost damage and of *Septoria* spot were showing in some lines. There was no rejection at shipside.

Only 5,760 cases of Valencia oranges were shipped; 5,411 to New Zealand and 349 to Singapore. A much greater quantity would have been shipped but for waterfront stoppages and the fact that Griffith was the only citrus area in this State able to give a "50-mile radius certification" as to freedom from fruit fly. The shipped fruit was of good quality. Rejections at shipside amounted in all to 208 cases, for dryness.

Only 430 cases of lemons, grown at Gosford and Griffith, were exported. They were shipped to Hamburg.

Apples.—The only apples exported in the first half of this financial year were Democrats from Tasmania transhipped at Sydney; 350 cases were forwarded to Hong Kong and 1,000 to Manila.

In all, 106,845 cases of apples were exported from Sydney this year; 91,829 of these were grown in this State, and the remaining 15,016 were from other States.

The shipments of 93,054 cases to the United Kingdom were almost entirely of the Granny Smith variety, drawn from widespread districts. This quantity would have been greater but for the spray residue problem and over-maturity.

The apple export season commenced in early March, 1958, and with a big crop, and good prices offering, many growers packed for export. However, several growers failed to comply with the export pack standard. Heavy rejections occurred at shipside.

Rejections at shipside amounted to 8,591 cases, amounting to a high percentage of a total export of 106,845 cases. Such heavy rejections are a costly business for all connected with the export trade. Chief reasons were spray residue, over-maturity, hail damage and, to a lesser degree, undersized fruit, San José scale, excessive blemish and bruising.

Spray residue is one big problem for growers who pack for the United Kingdom market; and those without brushes on their grader, or some means of freeing the fruit from residue, will have difficulty in complying with export trade standards.

Pears.—Four thousand and seventeen bushel cases of good quality Packhams Triumph pears were shipped to Singapore and Hong Kong.

Grapes.—Small quantities of Ohanez grapes, 380 cases in all, were shipped to Hong Kong and Singapore.

Pacific Islands' Trade in Fruit.—The Pacific Islands trade of fruits in season has been consistent throughout the year, with main shipments to Hollandia and Fiji. Fiji has relaxed some of the import restrictions on fruit. Consequently, quantities exported to that area increased.

Flour.—Sixty-four thousand two hundred and seventy-three short tons of flour were exported from Sydney. Up to early December, 1957, flour was exported in the usual quantities; but because of the severe drought in wheat-growing areas of New South Wales, restrictions on export then became effective and, except to New Guinea and the Pacific islands, there was no further export of flour.

Up to the time of the export restrictions, Singapore and Malaya were taking about 35 per cent. of our export. Indonesia was down to under 10 per cent., whilst the trade to the Pacific islands had increased to about 30 per cent. The rest of the flour was shipped mainly to the United Kingdom and Africa.

Rice.—Export of rice remained at somewhat the same level as in 1956-57. The main markets were New Zealand, the Pacific islands and the United Kingdom.

CITY MARKETS AND INTERSTATE SUPPLY INSPECTIONS

Apples.—The quality of apples for sale at the City Markets during November and December, 1957, was very poor. Most of this fruit was from Victoria. Generally the grading was unsatisfactory. Many consignments were marked down to lower grades before sale. Tasmanian shipments, which were well packed, were smaller than usual; and red mite infestation was limited. South Australia forwarded small, consistent supplies of high quality fruit.

New season apples were available from coastal districts early in December, 1957. They were mainly cooking varieties such as Carrington and Early MacIntosh Red. Early consignments of mid-season and late varieties such as Jonathan Delicious, and Granny Smith were very small due to drought. Widespread rains in the apple districts subsequently improved the size and quality of the crop.

Constant supplies of 1958 crop Victorian apples, of a high standard than usual, were received on the Sydney market. Tasmanian shipments were graded correctly and arrived in good condition; likewise consignments from South Australia. Many consignments of Jonathan, Delicious, and MacIntosh Red from Queensland were poorly graded and packed.

Pears.—Practically all pears in the City Markets during the second half of 1957 were from Victoria. Generally they were unattractive due to black spot and malformation. The "grading" markings on many consignments were higher than the standard of the fruit packed. Good quality pears were marketed during 1958, with little or no black spot or blemish.

Citrus Fruits.—The Navel orange crop was late mature. Many early consignments were withheld from sale, for maturity. The New South Wales crop was very light, increased supplies from South Australia and the Murray Valley districts kept the market well supplied. The quality of fruit was far superior to most of the local Navels, and grading and presentation were outstanding.

New season fruit is being marketed in increasing quantities from all New South Wales citrus districts. Most of it is large and of good quality and, contrary to the previous crop, all consignments tested for maturity have passed the required standard.

Small consignments of Valencias were marketed during August and September, 1957. These were tested for maturity and some consignments were withheld from sale for failure to satisfy the test. As the season progressed, heavy supplies came from inland and coastal districts, in addition to large quantities from South Australia and the Murray Valley.

Apricots.—Large quantities of small sized apricots were marketed from the Kurrajong and Hills districts during November, 1957. Supplies during December were from the Murrumbidgee and Murray Valley; all of good quality.

Peaches.—Early peaches from coastal districts were very small and almost unsaleable. They showed the effect of extreme hot weather. The only fruit that sized up well came from irrigated trees.

Cherries.—Heavy supplies of cherries came from Young and Orange. Most of the fruit was small and, in some instances, hard to market.

Plums.—Fair supplies of Wilson and Santa Rosa plums were marketed from coastal districts; mostly small but of good quality.

Strawberries.—Heavy supplies were marketed from Queensland; generally of good quality.

Potatoes.—Consignments totalled 1,345,316 sacks from local and interstate sources; 457,000 sacks more than in 1956-57. New South Wales supplied 102,260 sacks, and in general the quality, the grading, and branding of bags, were poor. Tasmania supplied 744,207 bags, Victoria 311,015, Western Australia 102,955, Queensland 74,735 and South Australia 10,110. Although Tasmania supplied more than half the total, little cause for complaint was found on inspection at wharves during discharge. The quantity of blight or moth-infested potatoes was negligible. Consignments from other States were well graded, of good quality, and arrived in sound condition.

DISTRICT AND SUBURBAN INSPECTIONS

Fruit Fly Eradication Campaigns.—Fruit fly outbreaks which did serious repercussions as far as the citrus industry is concerned, occurred at Narrandera and Dareton. On detection of fruit fly at these centres, and due to the fact that New Zealand will not accept fruits grown within a 50-miles radius where fruit fly has been found in the previous twelve months, growers in the Murrumbidgee Irrigation Areas and Lower Murray districts have lost this season's citrus export trade to New Zealand.

With the Dareton outbreak also affecting Victoria, the New Zealand market for this year has been mostly lost so far as both New South Wales and Victoria are concerned; and South Australia will be called upon to satisfy this trade.

When fruit fly was detected in January, 1958, at Narrandera immediate eradication action commenced. In the town forty-eight centres of infestation were found in an area embracing 10 allotments. During the campaign, which may have completely eradicated the fruit fly there, it was necessary to prosecute one grower and to issue 240 notices to Narrandera residents to carry out the required measures.

Fruit fly was detected in a few apples growing in home gardens in Dareton on 29th April, 1958. Actions were taken immediately to inspect surrounding areas and commence eradication measures. These included removal of all deciduous fruits from the trees, and spraying and baiting to an approximate distance of 1 mile from the two infested gardens.

Mildura District Citrus Co-operative Association donated £50 for the purchase of materials, and supplied spray outfits and personnel to spray all backyards in Dareton. Unfortunately, following the detection of fruit fly at Dareton, Victoria imposed restrictions on all Coomealla fruit entering the State and demanded 100 per cent. inspection of all citrus fruits prior to marketing in Victoria. An amount of £2,500 has been made available for appointment of temporary inspectors to carry out this work.

The outbreak of fruit fly at Corowa early in 1957 was successfully handled. Measures taken by the Division of Horticulture to destroy the pest in the township resulted in complete eradication. This outbreak was particularly severe. Corowa there are approximately 1,300 town properties with 800 backyard fruit trees. Infestation occurred on many properties scattered through the town.

A road block was maintained for four months at Euston on the Sturt Highway to halt traffic and inspect vehicles, to prevent the possible introduction of fruit fly into the Lower Murray fruitgrowing areas. N.S.W. and Victorian inspectors maintained the block. A great deal of useful statistical information has been obtained, although during the four months of fruit fly infested fruit was intercepted.

Citrus Gall Wasp.—The wasp can now be found in practically all suburbs surrounding Sydney but has not yet spread from there to any commercial citrus growing district in New South Wales. Efforts of the Division of Horticulture are now concentrated on preventing spread of the pest into commercial districts centred at Gosford, Wyong, the 'Hills', and the M.I.A. Five inspectors are engaged on inspection of nurseries and backyards as well as the perimeter of the commercial orchards in the 'Hills' district, and are taking appropriate action when infestation is detected.

District Potato Inspections.—Inspection of table potatoes continued, under the Plant Diseases Act and also on behalf of Certified Seed Potatoes Co-operative (N.S.W.) Limited. Difficulty was experienced in the matter of certified seed inspections. This was because of breakdown, mainly due to powdery mildew, generally not apparent at bagging and inspection time but readily visible after a few warm days.

Inspectional Staff Recruitment Problem.—Until recently it has been possible to obtain suitable recruits to maintain the inspectional staff establishment. Persons with some agricultural background and holding a certificate in Agriculture or Horticulture from the Sydney Technical College have been accepted and retained for inspectional duties. Now too few are offering and there are three vacancies for Inspectors under the Plant Diseases Act. The problem has been discussed with the Technical College staff. This may result in more applicants.

Prosecutions and/or Warnings under Plant Diseases Act, etc.—One hundred prosecutions occurred and 225 letters of warning were issued for offences under the Plant Diseases Act, Migration Act and Potato Licensing Act. Policing of the Potato Licensing Act has been very successful. The number of licensed potato growers would be very low at present.

Immature Citrus Fruits Campaign.—The campaign to prevent the marketing of immature citrus fruits has continued. Regular testings of early marketed fruit by inspectors, in the co-operatives and the growers' sheds, together with market inspections, have reduced the amount of immature citrus fruit reaching Sydney.

District Extension Work

Increased requests to fruit officers from growers and organisations for advice on all types of fruit production problems have been a feature of the year. To cope with the demand, all methods of extension have been used; the press, radio, field days, meetings, film nights, short-term schools and individual advice. Some of the district extension activities and problems upon which extension officers concentrated have been as follows:—

At Orange, The Hirst Spore Trap.—The spore trap was installed in the Orange district to provide data for a spray warning service to growers, to aid in the control of black spot of apples. The equipment was presented to the Department by the Orange Producers' Rural Co-operative Society.

At Batlow, Soil Fertility.—Much attention has been given to increase of soil fertility in Batlow orchards, the more so because most orchards in this district are approaching 40 years of age. Proper tree nutrition has also been emphasised as a means of correcting alternate cropping and low yields.

In the New England, Pruning Methods.—Demonstrations of improved pruning methods have been campaigned, together with better control measures for pests and diseases.

In Cumberland, Contouring, and Supplementary Watering.—New areas of high lands have been contour planted and provision has been made increasingly for water conservation in large dams, for supplementary watering of orchards.

On the Murray River, Orchard Design, and Drainage.—Frequent visits have been made in respect of land use and farm design on new settlements in the Lower Murray district. Drainage problems on Soldier Settlements received regular attention.

At Gosford, Supplementary Watering.—Supplementary watering of orchards has increased as a result of campaigning.

The Murrumbidgee Irrigation Areas, Scale and Moth Control.—Campaigns for the control of red scale by means of sprays, and special attention to the control of codling moth, have proceeded.

Agricultural Extension Grant Projects.—Nine projects are conducted by the Division of Horticulture under this Grant. The subject for eradication of apple black spot at Yetholme has resulted this season in the harvesting of the best and cleanest crop ever picked in the area.

Research Orchards, Laboratories and Advisory Committees

Fruit Cool Storage Investigations Advisory Committee.—This Committee met twice. It reviewed the work carried out co-operatively by the C.S.I.R.O. Division of Food Preservation and Transport and the Division of Horticulture. The work embraces cool storage and quick freezing investigations at the Homebush Laboratory of the C.S.I.R.O.

Fruit and Vegetable Processing Research Committee.—Officers of the C.S.I.R.O. Division of Food Preservation and Transport and this Department comprise this Committee, under the chairmanship of Dr. J. R. Vickery. At meetings during the year all current investigational work in fruit and vegetable processing was considered, and necessary arrangements were made for future work.

Commonwealth Dried Fruits Processing Committee.—This Committee acts in advisory capacity. It deals with all technical aspects of the dried fruits industry. At the annual meeting it considered technical problems raised by sections of the industry and discussed the design of investigations to overcome the troubles. The Committee also previewed existing long-range projects concerned with dried, vine fruit production.

N.S.W. Canning Fruits Advisory Committee.—The canning industry established this Committee to review constantly the canning fruit plantings and to advise the industry on planting trends. Extensive planting and replanting is taking place in the M.I.A. following heavy tree losses in the wet winter of 1956. The Committee has aimed to influence growers to plant suitable proportions of the more desired varieties.

M.I.A. Rehabilitation Committee.—Following a complete investigation of M.I.A. fruit tree losses by the Joint Committee of Investigation, recommendations were made for the



Citrus nutrition studies have been established at Narara Sub-station of the Gosford Citrus Experiment Station

(Photo. from Narara Sub-station)

rehabilitation and reconstruction of the horticultural industries there. The setting up of a Rehabilitation Committee was recommended, to investigate individual cases of hardship and loss and suggest measures for rehabilitation.

An officer of the Division of Horticulture was seconded for special duties as a member. The Committee has been engaged on the task throughout the year.

Bathurst Experiment Farm Orchard.—Additional data on apple breeding and apple and pear stock trials were recorded. Seasonal experimental activities, concerning pest and disease control and cultural methods, have proceeded.

New England Experiment Farm Orchard.—Experiments have continued with hormone sprays for thinning, and for prevention of pre-harvest drop, with satisfactory results. Blocks of cherries and peaches have been planted for variety trials next season.

Lower Murray Research Station Orchard.—One thousand seven hundred and fifty nursery stocks were budded in pursuance of the citrus research programme. The citrus arboretum was expanded by thirty trees. Experiments in the control of soft brown scale and investigations into "citrus yellows" disease proceeded.

Yanco Experiment Farm Orchard.—Trees in the old orchard section were used for experiments concerned with soil treatments and spray applications. Young plantings of citrus, designed to assess the merits of various rootstocks on heavy soils, were maintained; and trees killed by excessively wet conditions were replaced. The trees lost were all on rough lemon rootstock, indicating the inability of this rootstock to withstand over-wet soil conditions.

Griffith Viticultural Nursery.—Salt damage to *Phylloxera*-resistant mother vine plantings has increased, and all nursery land available for the propagation of cuttings is affected by salt to some extent. As a result, the propagation of *Phylloxera*-resistant rootlings has been transferred, as far as possible, to other establishments. The citrus trees have been satisfactorily maintained.

Gosford Citrus Experiment Station.—At the Narara section of the Gosford Citrus Experiment Station the main activities are fruit tree propagation, horticultural investigations, and the production of *Phylloxera*-resistant grape vine stocks.

Viticultural activity increased, with additional vine plantings and the initiation of a field investigational programme.

The first release of an improved strawberry variety was made.

A block of twenty-nine Troyer citrange trees was lished to provide material for future investigations. This strain of citrange has become increasingly important in the United States recently as a disease-resistant stock.

The Somersby section is devoted to citrus field trials still in course of development. About 1,800 trees have been planted. Earliest plantings are about to come into commercial production. The orchard area has been improved by underground drainage and soil erosion control measures.

Additional citrus plantings were made at both Narara and Somersby sections.

Gosford Citrus Wastage Research Laboratory.—Fruit positive contributions towards mould wastage control in citrus were made. The research is conducted jointly with the C.S.I.R.O. and has provided a practical means of reducing citrus wastage. This has now been adopted on a commercial scale.

A new method of applying wax coatings is under investigation. The method, known as "foam waxing", appears to be economical. It is simple and should prove advantageous to establish packing houses.

The eradication of larvae of the Queensland fruit fly from infested citrus fruits is a very important project. This is being extensively examined in a co-operative effort with the Entomological Branch of the Department and the C.S.I.R.O.

Over 60,000 fruit fly larvae were fumigated with Ethion (E.D.B.). Results showed that where fumigation resulted in not less than 2 parts per million of E.D.B. in the juice, no survivors occurred from a total of 60 larvae. This work was carried out in small, 10 cubic foot chambers with dosage rates of 16 and 18 oz. per cubic foot. The results are now being applied to the fumigation chamber at Gosford.

Banana and Other Tropical Fruit Industries

The dry conditions emphasised two important factors in the banana industry; firstly, the value of supplementary watering and, secondly, of effective beetle control.

Trends in the Banana Industry.—The banana acreage in New South Wales was 28,548, an increase of 957 acres this year; and there are now 1,200 commercial growers. Of the two main commercial varieties, 20,626 acres are planted to Williams and 7,824 acres to Cavendish. Production for the year was 2,341,795 cases from 25,292 bearing acres.

Approximately 56 per cent. of the bearing acreage consists of plantings made since 1952-53. This high percentage of young plantings becomes a significant factor, particularly in view of the over-all improvement in cultural practices, when future production and marketing are weighed.

The industry is concerned about high production trends, and the Banana Growers' Federation is examining means of dealing with possible over-production in the near future. A referendum is to be taken on the question of whether the merchant system of marketing bananas on the Sydney market to continue or whether it should revert to the agent system. The Division of Horticulture has supplied a list of commercial banana growers from which the nominal roll of producers will be compiled.

Regulatory work under the Plant Diseases Act was effectively carried out. Association with the Banana Disease Control and Development Co-operative Ltd. has been maintained effectively and harmoniously.

Breaches of quarantine regulations necessitated four prosecutions. Convictions were recorded in all cases, and fines totalled £37. Breaches of Banana Grading Regulations reported on Sydney markets resulted in twenty-seven prosecutions, with fines totalling £242.

Banana Beetle Borer (*Cosmopolites sordidus*).—Control by feldrin and Aldrin was further advanced. There is no doubt that borer control is already having an important influence on improved plant health and production. This was very apparent during the severe drought.

Bunchy Top.—The over-all position is satisfactory, with a slight improvement on the previous year in all districts excepting Brunswick. Even there, however, there is remarkably low incidence. Several local outbreaks occurred in all districts but were quickly brought under control. The number of bunchy top stools found was 3,925, in 28,548 acres.

Duranbah Demonstration Plot.—The annual Field Day at Duranbah Plot was held successfully on 6th November, 1957. Usually it is held in autumn as this is the best period for growers to attend. Other field days were held in different districts.

The Duranbah Plot continues to attract many visitors: growers and the general public. Organised parties with agricultural interests who visited Duranbah this year included undergraduates of the University of Sydney School of Agriculture, Gatton Agricultural College students (Qld.), Tweed Growers Farmers, and Stanthorpe Junior Farmers (Qld.).

The one acre production and cost figures from the Duranbah Plot continued to provide assessment and factual data for the industry.

Little further progress may be achieved in tropical fruit research work until the Alstonville Research Station is available. Meanwhile the main investigational programme in tropical fruits continued at the Duranbah plot.

Plastic Bunch Covers Trials.—The durability tests with plastic, P.V.C. film, bunch covers continued into the fourth year. Polythene tubing (Visqueen), in satisfactory diameter and coloured, became available for trial. This material proved to be satisfactory and is now recommended to the industry as an alternative to P.V.C. film. A further test was inaugurated in respect of plastic covers, by top and bottoming of covers to restrict air circulation. Temperature data were recorded.

Banana Plant Development Studies.—Studies of plant growth and bunch development relationships continued.

Selection of Strains of Cavendish.—A start was made on a programme of plant selection, using Cavendish for development of an improved strain of this variety.

Banana Packing Trials.—These investigations included (a) further trials of the new fibreboard case, (b) pre-packaging of bunches in polythene covers, and (c) bunch transport in polythene covers, and (d) smaller case trials.

Leaf Spot (*Cercospora musa*) Control.—Trials for *Cercospora* leaf spot control were continued. Results will be assessed in September, 1958.

Avocados.—Further commercial varieties were added to the existing variety plot; Linda from Coffs Harbour, and Nabal, Aas, and Zutans from Queensland.

Papaws.—The Solo variety has been expanded to permit further selection work within the variety. A new fungicidal-acaricidal material, Korathane, showed good prospects for controlling mildew and red spider.

Litchi.—The imported trees from Hawaii have established well, with only one loss. Two trees of South African origin transferred from the Botanic Gardens, failed to establish; through unfortunate transport delays.

Passionfruit Seed Germination.—Seed testing continued, and it is now quite apparent that seed stored in the fruit is quite satisfactory for periods up to twelve months.

Pineapples.—605 acres are planted in the Tweed, Brunswick and Richmond River districts; with most, 535 acres, in the Brunswick and Richmond River districts. There they come within the immediate influence of the Ballina cannery. More research and extension service is needed in this industry, to ensure future expansion on sound cultural lines.

Macadamia Nuts.—Development of a processing factory at Murwillumbah has promoted further interest, and at the same time provided a useful, local secondary industry. Small areas are being planted out, with trees raised from selected nuts.

Tropical Apple.—An interesting addition to the Duranbah Plot was a tree of the Tropical Apple. This fruit has had considerable publicity this year and is receiving overseas attention.

Weedicides in Plantations.—Dalapon was successfully demonstrated on persistent grasses closely associated with banana, pineapple and papaw plantations. It gave good grass control, without injury to the crop plants.

Citrus Industry

TRENDS AND EXTENSION WORK

Through adverse weather there have been light crops in two successive seasons, and many growers are in an unfavourable financial position. Trees with root systems injured by recent wet seasons suffered severely from frost. Many of them died.

Production Trends.—Production is increasing in the Mid and Lower Murray areas and will continue to do so. There are extensive young plantings in these areas. Production in the M.I.A. will also increase as young plantings come to maturity. The same applies to Narromine. Coastal production is steadily declining. This is likely to continue. Increasing interest in mandarins is reported from coastal districts. Plantings of lemons have increased because of good prices.

Irrigation.—Drought in coastal districts in the spring and early summer emphasised the value of irrigation. District officers gave it considerable attention and in particular assisted growers to obtain tests of irrigation water for salt. The irrigation method most favoured is the sprinkler type with fixed or semi-fixed installations. Portable types of spray irrigation are still used, but their high labour demand is reducing their popularity.

Pest and Disease Control.—Fruit fly control received special attention. Red scale was unusually prevalent in coastal districts, but inland districts were not unduly troubled until well into autumn. White wax scale control was poor in most coastal orchards. Brown olive and soft brown scales again caused anxiety, coastal and inland. The latter was very troublesome in Lower Murray orchards.

Sooty mould is a problem where scales occur, and the need to clean the fruit has led to packing houses' installation of washing plants.

Black spot disease is a threat to the coastal citrus growing economy. Costs of the spray programme, and the percentage of fruit lost, are a heavy burden and reducing growers' capacity to compete with inland districts not troubled by this disease.

Phytophthora sp. was active in the collar rot form in coastal districts.

Marketing Problems.—Disposal of considerable quantities of frost injured oranges was a big problem until processors, influenced by the light crop, operated freely at prices high enough to allow growers some margin of profit.

Another marketing problem was created when a large proportion of the Lower Murray districts' crop was forwarded to the Sydney market, there being no export market for this fruit because of fruit fly incidences. The Victorian restrictions on fruit from New South Wales are such that this outlet is now slight. Other than the Sydney market the outlets remaining to New South Wales growers are Brisbane, the Pacific islands and the Far East. The two latter are not major outlets at present.

Because of fruit fly little or no citrus fruit can be exported to New Zealand in the 1958 season, though minor quantities may be despatched after receiving low temperature sterilisation treatment as approved by the New Zealand authorities.

Unfortunately, the trade in New Zealand markedly prefers fruit that has not been subjected to low temperature sterilisation treatment. This emphasises the importance of developing a sterilisation treatment for fruit fly that will be acceptable to New Zealand and yet practical in application.

The low temperature sterilisation of citrus fruit for fruit fly is under special investigation directed by a Technical Committee in which South Australia, Victoria, New South Wales and the C.S.I.R.O. are represented. This Committee reports considerable progress in the past two years, in the use of ethylene dibromide as a fumigant, and is confident that the investigation will be successfully concluded in the next twelve months.

Processing.—Washing and waxing oranges is increasing in coastal and inland centres. Packing houses and, in a few instances, private growers, have installed the necessary plant. Associated with this trend is the adoption of sodium orthophenylphenate in the wash tank. This has proved an economical and effective mould prevention treatment. The work of the Citrus Wastage Laboratory has been influential in this regard.

Handling.—Increasing interest is being shown in bulk handling of citrus to reduce costs. Two packing houses on the Lower Murray are installing the plant required for bulk handling from the orchard. It involves bulk bins on trailers.

Draining.—Deep draining installation continued in the M.I.A. and also in the Coomealla Soldier Settlement. Under ground draining also received attention in coastal districts. Rate of installation declined this year, but the demand for field officers' advice was heavy.

Soldier Settlements.—Fruit officers acted in advisory committees in respect of Soldier Settlements at Coomealla and at Ellerslie in the Lower Murray-Darling area; as well as advising individual settlers.

Salting.—This had become acute in Curlwaa on the Lower Murray, following high water tables built up by prolonged flood and near-flood conditions in the Murray and Darling Rivers. It has lessened during the sustained period of low river height and consequent better drainage.

However, a high salt content in irrigation water pumped from the Hawkesbury River has caused concern. Damage was minimised by frequent testing and by discontinuing pumping as the danger level approached.

Propagation.—Drought conditions in the spring and summer, accentuated by severe metropolitan area restrictions on the use of water, made it difficult to grow stocks and raise seedlings. Thus trees and stocks are not so plentiful as they may have been.

P.V.C. plastic ties have completely displaced raffia as a tying material for buds.

Co-operative Citrus Bud Selection Society.—The Society was again assisted by inspection service, required under the Parent Tree Registration Scheme, to ensure freedom from bud transmissible disease and at the same time a high general quality. Assistance was also given in locating sources of bud supply. Buds were available to the Society from the trees maintained at the Narara Section of the Gosford Citrus Experiment Station.

Citrus for Propagation, Imported and Exported.—Trifoliata seed was supplied to India. Requests from Malaya and Dutch New Guinea are receiving attention. Action has been taken to import Rusk and Morton citranges from the United States Department of Agriculture.

RESEARCH IN CITRUS

Superphosphate and Citrus Quality.—The investigations at Yanco Experiment Farm revealed similar trends to those noted in previous seasons. Heavy rates of superphosphate, particularly as a surface dressing to the soil, have improved the external qualities of the fruit, reduced skin thickness, reduced acidity and increased the juice percentage; particularly in heavily cropping Valencia oranges. Application of phosphate in the form of a spray is also under investigation.

Citrus Stock Trial at Yanco Experiment Farm.—The unsatisfactory stock-scion combinations, Washington Navel on Morton citrange, and Valencia on Rough Lemon, have been removed. They have been replaced by trees worked on Cleopatra mandarin, Troyer citrange and S53/22 stocks. The trees in this planting are in very good condition.

Valencia Nutrition Trial.—A detailed experiment was commenced this season at Gosford Citrus Experiment Station in co-operation with the Biological Branch; to study the nutritional requirements of the Valencia orange. Individual trees have been planted in large pots, ninety-six in all. Various levels of several mineral elements have been applied to the soil in the pots. Recording of growth responses is proceeding.

Resistance of Trifoliata Selections to Waterlogging.—Six strains of trifoliata rootstocks have been subjected to waterlogging conditions at Gosford Citrus Experiment Station; for a close study of their resistance to such conditions.

Permanent Plantings at Gosford Citrus Experiment Station.—Further plantings have been made at both the Somersby and the Narara section of this Station. The plantings, 15 acres at Somersby and 10 acres at Narara, now include a wide range of investigations covering rootstocks, varieties, virus studies, etc.

Testing of Strains of Trifoliata Rootstock.—Strains of the trifoliata rootstock have been selected by the Citrus Improvement Committee, and twelve are under trial at the Griffith Viticultural Nursery. Twenty trees of each strain have been worked to Washington Navel orange, and this is the fourth season in which harvest yields have been recorded. There has been little difference between the strains.

Effect of Scaly-butt on Orange Yields.—The importance of selecting scions free from Scaly-butt is being demonstrated by experimental plantings for the Citrus Improvement Committee at the Griffith Viticultural Nursery. Where scions were taken from Scaly-butt-free trees the yields of the resultant trees have been three times as high as those propagated from infected scions. This has been so for several seasons now. Affected trees are also considerably stunted.

POME FRUIT INDUSTRY

Until December, 1957, it appeared that the apple crop could be a failure, but recovery followed the good rains in January. The crop was little below the record of 1954 when 2,400,000 bushel cases were harvested.

Drought-induced disorders were somewhat prevalent in some orchards on lighter soils or locations subject to speedy moisture loss. The disorders were epidermal spotting, particularly of Delicious and Granny Smith, bumpiness of Granny Smith, and stem-end cracking of Jonathan and Delicious.

Dothiorella limb canker has extended in coastal areas and is causing concern amongst early apple growers.

TRENDS AND EXTENSION WORK

Black Spot Warning Service.—This was in operation at Batlow and at Orange. It has been made possible by the use of spore traps and the co-operation of local radio stations, and has encouraged a very close relationship between growers and this Department.

Fibreboard Cartons.—Their use in lieu of the wooden case extended during the year. Much of the bruising associated with the use of wooden cases can be eliminated by using these cartons. A relevant mechanical packing device will be imported from the U.S.A. for the 1958-59 season. The use of cartons will then gain further impetus as they are necessary for the packing device concerned.

These mechanical packing units will be manufactured here under licence and, together with the cartons, will reduce the present high cost of presentation for market.

Bulk Handling, from Orchard to Packing Centre.—Increasing interest has been shown in the use of bulk handling equipment from orchard to packing centre.

Automatic Air-blast, for Orchard Spraying.—Both the semi-concentrate and dilute type have proved capable of an efficient job, with considerable savings in labour and time.

The "Iden" concentrate spray unit which this Department imported from England in 1956 and has had under trial in the Batlow district has caused a lot of interest. This machine, of very simple design, employs a revolutionary method of spray application and may still further reduce costs and time in spraying.

Orchard Water Storage for Supplementary Watering.—Dry conditions experienced this year resulted in a marked increase in facilities for supplementary watering, in many districts. The number of bores, wells and dams constructed during the past twelve months was a record in fruit growing areas.

Pre-packaging in Polythene Bags.—This commenced this year, with small W.B.C. pears. It was so successful that it was carried on throughout the season with apples. As the fruit sizes to which the bags are applied are mainly those not popular on the Sydney markets, the scheme could have a definite stabilising effect on the main central markets.

Privately Owned Cool Storage Space.—In the Orange district this has increased by 11,000 bushels during the year. There are now thirty-five privately owned orchard stores in that area, where total storage space now approximates 422,000 bushels. Several more private stores have been projected there for the near future.

Plantings.—Of 1,336,502 apple trees in N.S.W., almost 20 per cent. are not yet bearing. The proportion of non-bearing to bearing trees is satisfactory and more than sufficient to make good a normal wastage amongst the older plantings. About 75 per cent. of the total of trees is composed of the three varieties Granny Smith, Delicious and Jonathan.

There is a marked tendency also for new plantings to be confined to six main areas—Orange, Batlow, New England, Murrumbidgee Irrigation Areas, Oakdale and Bilpin. Between them these account for approximately 94 per cent. of the non-bearing trees now planted. This, and since the young trees are of popular varieties and on good stocks, should ensure that N.S.W. production will increase rapidly in the next few years.

RESEARCH

Pome Fruit Storage.—Investigations continued in co-operation with the C.S.I.R.O. Division of Food Preservation and Transport at the Homebush laboratories.

Controlled Atmosphere Storage of Apples.—The experiments continued with emphasis on the Granny Smith variety. They are designed to compare the effects of different concentrations of oxygen and carbon-dioxide on the quality of fruit and its storage life.

Superficial Scald Inhibited by a Chemical.—Diphenylamine has again been demonstrated to inhibit superficial scald. It may be applied as a dip or impregnated into a wrap. As such it has controlled scald in a variety of atmospheres in which Granny Smith apples may be stored. Application of diphenylamine as a pre-harvest spray has shown considerable promise and is still under investigation. Because of the danger to health this substance cannot yet be recommended for commercial use.

Sealed Polythene Film Liners Inside the case.—Their use is being investigated. With the Packhams Triumph pear variety this work has been in progress for several years, and in this year the fruit responded well to treatment, the storage life of the fruit being increased by two months by the treatment. The behaviour of other pear and apple varieties in sealed polythene case liners has also been under study.

Wastage of Stored Winter Cole Pears due to Blue Mould.—The mould has been greatly reduced by use of the fungicide sodium ortho-phenylphenate. Further experiments will aim to overcome the problem of injury to the skin of the pear, associated with the use of this fungicide.

Chemical Thinning of Apples.—Chemical thinning sprays gained in popularity in 1957. The prospect was heavy fruit settings, and conditions at the commencement of flowering were dry. The techniques adopted were as previously recommended. There seems little need to amend the recommendations.

Trials in the Camden and Oakdale districts are testing the consistency of the thinning effect from year to year.

Alternate Cropping of Apples.—Trials were initiated to advance the use of chemical thinning to reduce alternate cropping. Delicious was selected, as a difficult variety in this respect, and the combined effect of chemical thinning and nitrogen application in the heavy crop year was investigated at Bathurst and Oakdale.

Previously, supplementary nitrogen application in the heavy crop year seemed to increase fruit set and thus aggravate the alternate cropping trend. The current aim is to determine the effect in the heavy crop year, of supplementary nitrogen on bud development, when the fruit setting effect is controlled and offset by the use of chemical thinning sprays. The nitrogen is applied as urea sprays and by ground application. The experiments will be partly concluded with the recording of the flowering and fruit setting of the treated trees in the 1958-9 season. Normally this would be "off-crop" year for the trees.

Stop-drop Sprays and Maturity of Early Apples.—Effect of the stop-drop spray 2,4,5-TP on early varieties of apples was investigated for the third successive season. The results confirm that, for varieties earlier than Jonathan, 2,4,5-TP (but not N.A.A.) can produce earlier colouring and maturity; but that when sprays are correctly applied this is very slight and without deleterious effect on the fruit.

Pre-harvest Drop Control of W.B.C. Pears.—Experiments continued at Yanco Experiment Farm. Again, low concentrations of 2,4-D were as effective as the standard N.A.A. spray. The effect of 2,4-D sprays on storage behaviour of Packhams Triumph pear is now under investigation.

Improved Rootstocks for Pome Fruits.—A collection of Woolly Aphis-resistant rootstocks is maintained at Gosford Citrus Experiment Station. The stocks are used in tests to find still better rootstocks for apple and pear trees. In the collection are introduced lines of the Merton Malling series and also selections made by the Division of Horticulture from material evolved in the apple breeding programme.

Stone Fruits, Berry Fruits, Dried Vine Fruits, Nuts and Miscellaneous Fruits

In coastal areas the dry conditions affected the sizing of early maturing varieties of stone fruits. The trees also were damaged by the high temperatures in November.

Fruit tree planting operations in the Murrumbidgee Irrigation Areas were handicapped by winter rains.

Conditions favoured the production of grapes for dried vine fruits and also drying of the crop. The dry season allowed large crops to be handled expeditiously and resulted in high yields of first-class dried fruit.

TRENDS, AND EXTENSION WORK

The advisory services of fruit officers have been in heavy demand by individual growers, growers' organisations and industry groups. All avenues of extension have been exploited.

In the Young district, four successful orchard field days to emphasise the importance of maintenance and improvement of soil fertility and control of pests and diseases, and six pruning demonstrations, were conducted.

Young district production of prunes is not expected to vary appreciably for a few years, but a gradual falling off of production can be expected.

Considerable numbers of Narrabeen plums have been planted at Young in areas unsuitable for cherries.

Considerable plantings of new areas of cherries in the Young district are being made each year. However, increased production will be slower than was anticipated because of tree losses in the past two years, firstly from excessively wet conditions and then from drought. Demand for the new varieties released by the Department is expected to increase as propagating wood becomes available.

In the M.I.A., following requests from the M.I.A. Horticultural Conference, more attention has been given to prune growing. A new bulletin dealing comprehensively with prunes under irrigation is in compilation. Early canning peaches have been inspected and discussed at well attended field days for the purpose.

Following extensive losses in the 1956 wet winter, extensive areas have been replanted to peaches in the M.I.A. Mortality in young trees has been excessive in many cases where land was not properly prepared, and where other needs for peach planting were not met.

Loss of apricot trees in the M.I.A. brought about by the 1956 wet winter will be reflected in lower production of canning apricots for some years to come. New plantings have not been sufficient to maintain the total acreage at the 1956 level.

The trend to plant only the d'Agen variety of prunes in the M.I.A. continues, and planting rate is approximating the rate of removal of old trees.

In Gosford district, requests for advice on orchard reconstruction have increased, because of the trend there to replace declining citrus trees with stone and pome fruits.

In Mid-Murray districts, demonstration plots of peach, apricot, plum and prune trees have made good progress. The trees will be used to demonstrate cultural operations and handling methods to growers who find it necessary to reconstruct with stone fruit trees in place of vines.

Development in dried vine fruits has slowed down following the completion of Ex-Servicemen's Land Settlement in the Coomealla area. Development at Buronga is proceeding, as the farms for horticulture have been allocated; and some plantings for production of dried vine fruits will occur there.

The stabilisation scheme for sultanas and currants put forward by the Commonwealth Government failed to obtain the support of a sufficient percentage of growers.

In Cumberland, the suitability of old citrus ground for stone fruit growing, particularly peaches, has led to a steady expansion of acreage under early stone fruit in the 'Hills localities.

Halehaven Peach.—This is now prominent in all peach growing districts.

Plum Stocks for Peach and Apricots.—Interest in this is still high in coastal districts. However, growers who have replanted areas lost during the wet years have used peach stock; mainly because of its effect on fruit quality.

RESEARCH

Pruning and Thinning of Canning Peaches.—Yanco Experiment Farm tests have shown that a modified system of pruning Golden Queen, using long laterals, is not as satisfactory as the orthodox system. In particular, it increases the required amount of hand thinning. With a number of other varieties a new system of pruning known as the "Californian Hangar system" is under trial, for the second season.

Peach thinning investigations were intensified, to find data on which to base estimates of the required degree of hand-thinning. Several systems are under investigation.

Introduction of Canning Peach Varieties.—The programme of introducing new varieties was continued. Some South African varieties were introduced via Victoria. Most of the earlier introduced varieties performed very well this year.

Trial of Canning Peach Varieties.—In variety trials at Yanco Experiment Farm, Phillips showed out particularly well this season. It yielded at a rate in excess of 8½ tons per acre. Golden Queen, Pullar, Fairless, Gaume, Windra, Warden, Vincent and Ellis, in decreasing order of merit, all yielded in excess of 6 tons per acre. The varieties Youngs and Levis again were disappointing. They produced less than 4 tons per acre, of generally small fruit.

Urea Sprays on Peaches, Undesirable.—This trial, now of several years' standing, was designed to test urea-containing sprays as alternatives to soil application of nitrogenous fertilisers. It has been found an ineffective means of applying nitrogen to peach trees, but also to have an actual depressant effect on tree growth and yield.

Internal Breakdown of Apricot Fruits.—Yanco Experiment Farm trials were continued. Breakdown was not serious this year, but results confirm that the amount of breakdown increases with the rate of sulphate of ammonia fertiliser and with heavy irrigations just prior to fruit maturity.

Apricots' Response to 2,4,5-T Sprays.—Compared to previous seasons, the results have been disappointing at Yanco and in coastal orchards. No satisfactory explanation can be advanced, but the hot dry growing season may have been a factor.

Strawberry Improvement; "Bountiful" Variety Released.—The first release of a variety arising from the programme of selection of high quality virus-free strains has been made. It was named "Bountiful", and some 1,500 runners were released to growers for field testing. At least one other selection shows promise, and six other selections are being critically tested.

Herbicides for Strawberry Beds.—Hormone and chemical herbicides for the control of weeds in strawberry beds have been further investigated. The work is continuing.

"Delayed Foliation" of Deciduous Fruit Trees.—"Delayed foliation", through winter temperatures insufficiently low to satisfy the rest-requirement, was much more evident after the warm 1957 winter than previously. Consequent trials of D.N.C.-oil sprays to rectify the position thereby had a better chance of clear results.

Experiments were conducted at Speer's Point, Kurrajong and Dural; with early peaches, Caselin apricots, and Granny Smith and Willie Sharp apples. Most spectacular results were obtained with the apple and apricot varieties. These blossomed one to two weeks earlier than the untreated trees.

Temperature records have been collected and used to show the parts of N.S.W. subject to "delayed foliation"; i.e., where mean winter temperature exceeds 54 degrees F.; and to show that the 1957 winter was unduly warm.

Prune Stock Trials.—Prune stock trials are in progress at Young and in the M.I.A.

At Young, two trials have been selected for recording results. General observations will be continued on the remainder. Trees on Buck plum (PH5) stock have made best growth and produced trees much larger than those on other stocks.

In the M.I.A., annual and biennial pruning have been compared; on trees worked on strains of Myrobalan, Marianna, Buck plum, and *Prunus mume*. So far, Buck plum is the best of the stocks, and biennial seems as good as annual pruning.

Prune Rust Control Plots.—Commenced as an extension demonstration in the Young district, the work was expanded to a major trial of new fungicides and to find means of reducing cost control. Zineb with oil has again been outstanding, but not nearly so complete where the oil spreader was omitted. Phenyl mercuric chloride has given promise as an eradicant.

Prune Planting Trial.—The trees in the trial were planted in 1957. So far there are indications that factors other than proper care and attention may be responsible for unsatisfactory establishment of new prune orchards in the Young district. Increased growth has been obtained in trees in sites fumigated with "Vapam" before planting; indicating that soil organisms may normally be retarding tree growth.

Wine and Table Grapes

WINE GRAPES

Despite the drought, over-all New South Wales production of wine grapes in 1958 would be the highest since 1954. Wine production for the 1957 vintage was 3,463,097 gallons. It is estimated that about 4,200,000 gallons were produced in the 1958 vintage.

The M.I.A. season was extremely dry and notable for the absence of vine diseases.

Total production of wine grapes in the M.I.A. for 1958 amounted to 21,092 tons, compared to 17,467 tons in 1957. This was the highest recorded in the district since 1954, when 25,000 tons were harvested. In addition to local production, 1,278 tons, mainly of the Gordo Blanco variety, were brought in from the Murray River districts for processing.

Prices paid for grapes by M.I.A. wineries were again increased by £1 10s. 0d. per ton on all varieties except Black Shiraz. Price of the latter increased by £2 10s. 0d. per ton. Most growers regarded the increases as inadequate.

Wine grape acreage in the M.I.A. has fallen somewhat in recent years. Latest available figures show a reduction of 311 acres between December, 1955, and December, 1956. The fall in acreage is likely to continue.

In the Hunter Valley most vineyards showed signs of drought distress towards vintage. Even so, production from most vineyards was much higher than in the 1956-57 season. Some vineyards were severely damaged by hail early in January, 1958.

Vintage conditions were satisfactory, although light rain which fell during the early part caused some anxiety. On the whole, the grapes were clean and again showed a high sugar test. Wine quality can be expected to be well above average.

Hunter Valley total production would be in the vicinity of 1,000 tons, compared with 1,013 tons in 1957. Some replanting is occurring in the Valley, but the over-all acreage would not be noticeably changed.

TABLE GRAPES

Table grape production in the M.I.A. was appreciably higher than in the 1957 season, and quality was good. In all, 270,329 half bushel cases were marketed locally, as against 161,509 in 1957.

Table grape production in the County of Cumberland was lower than in 1957, and quality was not good. The vines were distressed by the hot, dry weather.

Considerable interest is being shown in table grape growing in the County of Cumberland, and the current season's demand for *Phylloxera*-resistant rootstocks is the highest for many years.

EXTENSION

Requests for information on grape growing were numerous throughout the year. The Special Fruit Officer (Viticulture) made frequent visits to properties in the wine and table grape districts, for advice to growers on disease and pest control, pruning, cultivation, rootstocks, etc.

The Superintendent of Griffith Viticultural Nursery, and district fruit officers, fulfilled the usual service to grape growers in the M.I.A., advising them on all aspects of viticulture.

Generally, district fruit officers have become more active in the viticultural extension field. Their greater participation is enlarging the scope of viticultural extension work and also enabling the staff specifically engaged in viticulture to increase their range of activities.

Wine Making Advisory Service.—Requests for information and advice on wine making were numerous. An appreciable number of wines submitted for examination were analysed by the Special Fruit Officer (Viticulture) at Head Office and in the Oenologist's laboratory at Griffith Viticultural Nursery. Advice regarding subsequent treatment was given as needed.

"Dead-arm" Disease.—A trail of various treatments to control "dead arm" disease failed to yield results. The disease first appeared in the M.I.A. in the 1956-57 season. Dry weather in 1957-58 apparently prevented development of the fungus.

Survey of Virus Diseases in Vines.—Officers of the Division took part in the State-wide survey to ascertain the incidence of virus diseases in vineyards. Almost certainly, leaf roll is present in all major districts. Propagational work involved in the virus disease investigations was assisted by the Division of Horticulture.

Bud Mites in O'hanez Variety.—It was confirmed that bud mites cause extensive damage to O'hanez buds and a preliminary control trial was commenced. The mites are protected within the bud, and time of application of insecticides will be critical if control is to be obtained. Experiments are in hand to determine when the mites migrate from the old to the new buds.

Vine Moth.—The caterpillars extensively damaged the vines in the Hunter Valley after vintage. Most vineyards were stripped of leaves, as growers made no attempt at control. They consider that loss of leaves after vintage is of little consequence.

Vine Mites.—These were more prevalent than usual. Where the recommended control measures were carried out no trouble was experienced.

Replanting of Mother Vines.—The decline of mother vine plantings, mainly at Griffith Viticultural Nursery, through salt, has given rise to a replanting programme. Three acres of mother vines were planted at Yanco Experiment Farm in 1957. Another half acre will be planted during the 1958 winter. The area of the mother vine block at Yanco Experiment Farm will then be 4½ acres. Condition of the vines is excellent.

RESEARCH

Experimental Wine Grape Planting.—Development of the wine produced from the Experimental Plot at the 1957 vintage is excellent. The Plot was severely affected by the drought in the 1957-58 season, so this crop was light and was not harvested.

Rootstock Trials—Table Grades.—Sufficient grafted vines of Black Muscat on eight separate rootstocks have been raised to plant one complete rootstock trial in the County of Cumberland during the 1958 winter. The take of grafts was not high enough to plant two complete trials, as was originally planned. Additional vines will be raised for planting in 1959.

Improving Strike of Phylloxera-resistant Cuttings.—This trial was commenced in the 1957 winter. It involved hormone and fungicidal treatments and the effect of cutting position on the canes. Visual differences between treatments have been noted, but an accurate assessment of results cannot be made until the cuttings are lifted. Further experiments have been planned for the 1958-59 season, when the main addition to the trial will be a treatment to test the effect of length of period of stratification.

Nutrient Deficiencies of Vines.—Analyses of vine leaves collected from all viticultural districts in New South Wales as well as from other States have been completed. These will be used as a guide to the normal nutrient level of vines. They will enable more definite inferences from comparisons with analyses of vines showing suspected nutrient deficiencies.

Cultural Treatment Effect on Ripening of Muscats.—The factors responsible for frequent failure of the Muscat variety to ripen all bunches have been studied. Experimental treatments were applied during pruning and bunch thinning, to obtain crop densities ranging from very light to very heavy. At harvest period the progressive colouring, acid content, sugar content, berry size and progressive yield were determined weekly. Generally, lighter crops were associated with earlier ripening. However, where canes carried single bunches the ripening process was more advanced than where two bunches were left on each cane.

Use of 2,4,5-T on Grapes.—This trial was repeated. It confirmed that maturity is delayed by 2,4,5-T; but this season serious foliage injury also occurred. Recently published results from South Africa are in full agreement with our original findings.

Chemical Control of Johnson Grass.—Dalapon for the control of Johnson grass in vineyards was further tested. Drenching sprays of 1, 2 and 3 oz. per gallon, provided an application rate of approximately 3, 6 and 9 lb. per acre to the actual sprayed area beneath the vine (i.e., 18 inches either side of the vine row).

The concentration of 2 ounces per gallon appeared to give almost 100 per cent. control and was better than 1 ounce per gallon. Three ounces per gallon proved no better than two ounces. The application was made in November. In February, following heavy rain, regrowth after all treatments was appreciable. It appears that a second application is required when regrowth occurs.

Fruit Packing—Extension Service

The Fruit Packing Instructor resigned in December, 1957. The position is still vacant. The former occupant fulfilled valuable extension work by way of demonstrations, tuition of packing classes, publication of relevant articles, and trials with new cases, cartons and bags. Scope for continued extension activities in these respects is considerable, for fruit and vegetables. The position should be filled in the near future.

DIVISION OF DAIRYING

The activities of the Division comprised administration of Acts and Regulations, herd production improvement activities, and extension and research affecting the efficiency of the dairy-industry.

Unfavourable conditions prevailed over the greater part of the dairying districts. The spring and early summer were very dry. During the drought, extensive inland irrigation was affected by restrictions on the use of irrigation waters; and in coastal areas most rivers become salty well up from the mouth of the river. Fair rain during the late summer did not lead to higher production, since stock were then well advanced in lactation and did not respond. Autumn and early winter were more favourable due to the mild temperatures but, other than in Milk Board areas, there was no substantial increase in production.

Because no serious flood occurred in any dairying district the lower river farmers were able to re-establish themselves.

The value of farm conserved fodder was well illustrated by the dry season.

A concerted drive was continued by dairy officers to improve the quality of milk and manufactured products, particularly butter, by check grading at factories, by farm instruction, press statements, radio talks and general extension.

Regulatory Services

DAIRY INDUSTRY ACT

Advisory Committee.—The Dairy Produce Factories Advisory Committee, constituted under the Dairy Industry Act, met on five occasions to consider applications for registration, or variation of registration, of the purposes for which six dairy produce factories could be used. Five applications were approved and one was rejected.



School of Dairy Technology

There are now thirty-three students in the Diploma of Dairying course at Hawkesbury Agricultural College and thirteen of them are there by virtue of the Apprenticeship Scheme financed by the dairy products industry. Of fourteen students who completed the Diploma course in 1957, seven were in the Apprenticeship Scheme.

(Photo. from Dairy Division)

At 30th June, 1958, there were 100 registered dairy produce factories and 66 registered dairy produce stores.

Appeal Board.—The Appeal Board, constituted under section 24 to deal with appeals against decisions of Inspectors under the Act, did not have occasion to meet.

Registration of Factories and Stores.—Plans and specifications of proposed dairy produce factories and/or stores and of alterations to existing factories, were submitted to specialist officers for approval.

Factory plant, buildings and machinery were kept at a satisfactory standard of construction and hygiene through improvements and replacements.

Dairy Science Schools, and Certificates of Competency for Factory Operatives.—Six Dairy Science Schools were held, at various centres, with a total attendance of 97 candidates, including 15 Hawkesbury Agricultural College students. Examination of factory operatives for certificates of competency were also held elsewhere.

Certificates were awarded on the results obtained at Dairy Science Schools and elsewhere as follows:—

			Examination of Dairy Factory Operatives Elsewhere Than Dairy Science Schools	At Dairy Science Schools
Cheese Making	...	...	4	...
Milk Grading	...	...	61	...
Butter Making	...	...	10	...
Cream Grading	...	...	...	39
Milk Testing	...	...	...	60
Cream Testing	...	...	...	45

Butter Manufacture and Grading.—The butter grading staff regularly examined butter and cheese manufactured by N.S.W. factories and received at Sydney, Newcastle and Goulburn for distribution and storage prior to sale on the local market. Butter manufactured at Casino Co-op. Dairy Society was also examined prior to cold storage at that centre.

Resultant information in each case was furnished to factory managers and district dairy officers to assist in overcoming any quality faults or other manufacturing defects noted in the grading examination.

To supplement local production during the late autumn and winter and early spring months, considerable butter was received from other states. At the request of the selling agents the quality of practically all of this butter was checked by graders prior to distribution.

The number of boxes of butter from interstate and interstate sources examined by the N.S.W. graders totalled 1,630, compared to 1,378,815 boxes in 1956-57.

The services of officers as Judges and Stewards in the Dairy Produce Section at the Royal Agricultural Society's Show, Sydney, the North Coast A. & H. Society Show, Lismore, Newcastle A. & H. Society Show, and the competitions held in conjunction with the annual Conference of the Factory Managers' and Secretaries' Institute, N.S.W. Division, were availed of by the respective show society.

Moisture and salt content of butter manufactured at N.S.W. factories were analysed, and the results were forwarded to district dairy officers.

A bacteriological survey was conducted in conjunction with the Department's Biological Branch, on butter manufactured at N.S.W. factories arriving at Sydney and Newcastle sell floors during the season peak of the months November to April, inclusive.

"Choicest Butter" Percentage.—The percentage of choicest butter manufactured from cream, based on conditions set in terms of the Department's Order of Merit published each year for the information of factory managers, was 86.8 per cent.

The comparative figures for the previous four years were: 1953-54, 83.3 per cent.; 1954-55, 78.8 per cent.; 1955-56, 80.5 per cent.; 1956-57, 83 per cent.

Certificates of Merit to Butter Factories.—Certificates of Merit of the Department are awarded to butter factories which in a given twelve months period, submit for grading a given percentage of their total "choicest" grade production and which 92 per cent. is, after grading, found to be true to brand description.

The number of factories which have been awarded Certificates of Merit over the last five-year period have been: 1953-54, nil; 1954-55, 3; 1955-56, 2; 1956-57, 2; 1957-58, 4.

Milk and Cream Quality Inspections and Advisory Visits.—Officers spent in dairy produce factories 7,227 hours check grading milk and cream and the manufacture of other dairy products. Some 387 visits were made in connection with check grading milk and 721 for cream.

Arising from these checks, 1,799 farms were visited to advise farmers how to overcome effects. Eighty special investigations were made on farms for milk and cream defects and 86 special investigations were made in dairy produce factories.

Margarine Production.—Quotas for the manufacture of table margarine to a total of 8,750 tons were issued to dairy produce factories registered for margarine manufacture.

Some 2,274 tons of table margarine were exported to other states. Permits to export table margarine overseas to a total of 8,750 tons were issued to firms; but only 256 tons were actually exported.

Cheese.—Cheese consignments received at Sydney and Newcastle were graded regularly. Samples representing some 40,000 x 14 lb. cheese blocks were graded.

Cheese graded showed a slight improvement on previous years. Little choicest quality was noted in the grading but there was an increase in the amount of 1st grade cheese.

Manufacture of rindless cheese again increased and there is now only one commercial factory not packaging cheese, square or round in a transparent or translucent material.

The method has increased the attractiveness of cheese from the consuming public's point of view, although in many cases the quality of the cheese within the pack leaves room for improvement.

The effectiveness of the various transparency wrappings, in preventing mould and mite infestations and loss of weight, was apparent; so too was the need to use refrigerated transport for delivering cheese to the retailer.

Bulk starter units for the propagation of starter for cheese manufacture have been installed in three factories during the year. This has enabled better control of starters to be maintained and a more even quality of cheese to be produced.

Group Herd Recording Scheme—Inter-year Comparisons

Year	Number of Cows Recorded	Average Butterfat Production per Cow	Cost of Scheme					
			Contributors			Total		
			Commonwealth Government	State Government	Participating Farmers			
		lb.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1953-54	58,667	186.0	16,301 12 4	24,182 7 8	24,722 9 6	65,206 9 6		
1954-55	58,216	208.0	17,934 6 8	27,989 0 7	25,813 19 5	71,737 6 8		
1955-56	65,000	215.0	19,879 14 0	31,619 18 9	28,019 3 3	79,518 16 0		
1956-57	66,500	208.0	20,067 13 2	30,695 16 1	29,607 3 6	80,270 12 9		
1957-58	54,479			Not available.				

The third year of operations for punch card equipment has been completed. Final results for 1956-57 were received from the machine room some eleven months after the end of the year. However, the results for the year ending June, 1958, are expected by the end of October, 1958.

There was much adverse comment from farmers on the lateness in getting out the records but this has been unavoidable because of difficulties associated with initiating the system. From now on results will be much more prompt, and, moreover, certain research will be possible during the year.

Calf Marking Scheme.—This Scheme provides a means of positive identification for female replacement stock. It is a basic need in herd improvement.

During the year 5,834 calves were marked. Thus the total so far marked is 56,139 in 1,464 herds. Seventy-four herds have newly adopted the Scheme during the year. In the total of calves marked are 2,157 got by artificial breeding, including 623 for the 12 months ended 30th June, 1958.

From now on considerable figures will be available in respect of stock got by artificial breeding, and thus a steady flow of information relevant to the value of this breeding method.

Certified Bull Scheme.—To 30th June, 1958, some 568 applications for certificates have been received in respect of bulls and 391 certificates have been issued, indicating the eligibility of calves of those sires to be marked as Merit calves.

A survey of cheese manufacturing methods was conducted in the Lismore, Kempsey and Maitland Districts over a period of four months. Results to hand indicate that more rigid control is needed in adjusting milk composition for cheese manufacture.

DAIRIES SUPERVISION ACT

Supervision of dairies was under the jurisdiction of Local Authorities—Shire and Municipal Councils. Officers of the Division of Dairying examined the effectiveness of the supervision. This survey showed that the degree and quality of supervision varied greatly throughout the state. In some cases, no supervision was performed. In others a reasonable job was performed.

PURE FOOD ACT

Two prosecutions were launched for breaches of the Pure Food Act. The fines totalled £19, plus costs of £2.

FACTORIES AND SHOPS ACT

Dairy officers inspected on behalf of the Department of Labour and Industry the provision of amenities for and protection of employees from dangerous machinery in dairy produce factories.

Herd Production Improvement Scheme

Herd Recording.—Sixty-six units operated, with 54,479 cows being recorded under Group Recording and an estimated 7,000 under the Official Scheme. The figures represent an increase estimated at 400 in the Official Recording Scheme, but a big drop in the number of cows recorded in the Group Scheme. This was due to the adverse season.

Sire Survey.—The extraction of progeny records continued. In the *Group Section*, two years' figures have been made available from the Punch Card Equipment. The sorting and extraction of suitable data are proceeding.

In the *Official Section* the primary compilation of figures has continued but it has not yet been possible to collate and finalise them. The work will be in abeyance until the data are on Punch Card Equipment.

Artificial Breeding.—Now that the N.S.W. Milk Board is responsible for the control of artificial breeding at Berry, the work of the Division of Dairying in selection of bulls has declined to an inconsiderable level.

Control of Government Herds

Government Dairy Herds continued to receive considerable attention. They were represented at the Royal Agricultural Society's Show, Sydney, by Friesian, Jersey, Australian Illawarra Shorthorn and Guernsey cattle. In general they are regarded as having been the most successful ever to represent the Department in a Dairy Cattle Section.

The outstanding performances were of two bulls purchased overseas by the 1955 Stud Stock Buying Delegation led by the late Minister, the Hon. E. H. Graham. The Friesian



Champion of Friquet de Haut (Imp.) 16118

He is located at Yanco Experiment Farm. For the second successive year he was Champion Guernsey Bull at the N.S.W. Royal Agricultural Society Show, Sydney. The dairy cattle teams from Departmental studs in 1958 were probably the best ever exhibited by the Department

sire, "Snider's Fond Hope King" (Imp. Can.) and the Guernsey sire, "Champion of Friquet de Haut" (Imp.), were each awarded the Senior Male Championship in the respective section for the second successive year. Several major awards were gained also in the Production Competitions.

Extension Services

Dairy Science Schools.—Six Dairy Science Schools were conducted, for instruction of factory operatives and their examination for certificates of competency in milk and cream testing and cream grading. Ninety-seven operatives attended these classes.

School of Instruction for Factory Operatives.—A School of Instruction for factory operatives was conducted at Lismore by dairy officers of the No. 1 (Lismore) Dairying District. It aimed to assist factory operatives in the theory and practice of milk and cream testing, and milk and cream grading, for Dairy Industry Act examinations. The School was conducted at night and comprised twenty-five lectures.

Addresses by Dairy Officers.—Addresses were given by dairy officers at Dairy Farmer Refresher Courses, field days, film evenings, Agricultural Bureau meetings, Junior Farmer Club and other farmer gatherings.

War Service Land Settlement.—Estates allotted to ex-service-men were visited and advice was given to soldier settlers.

Dairy Farm Improvement Competition.—Various country centres were visited by specialists to examine and assess the work of seventy entrants for the Dairy Farm Improvement Competition sponsored by the "Farmer & Settler Newspaper".

Production Improvement Project.—The Project was maintained and many relevant farmers throughout the State obtained dairy officers' information and assistance in the management of their dairy farms.

Milking Machine Efficiency Survey.—One officer was stationed at each of the towns, Lismore, Taree and Nowra, to survey milking machine efficiency in the surrounding districts. Data were collected by these officers for correlation and analyses by the Dairy Research Officer at Hawkesbury Agricultural College.

In the course of the surveys farmers were advised of the faults found in their machines, and of repairs, replacement of parts, and adjustments, to bring their machines to a satisfactory standard. This service was well received by the farming community.

Testing of Air Flow Meters.—A Testing Station for Air Flow Meters was put into operation at Hawkesbury Agricultural College, with the help of funds from the Commonwealth Dairy Industry Extension Grant. It is designed to provide testing of Ruakura Air Flow Meters throughout Australia. These meters are used for the testing of the efficiency of milking machines. Previously, if a fault developed or was suspected it was necessary to send the meter to New Zealand for checking.

"Items of Interest"—Abstracting Service.—Twenty-five selected items of interest from technical publications were distributed to dairy officers and to various dairy industry authorities throughout the State. Their effect has been illustrated. For example, a "Milk in Bags" item proved of such interest to a margarine manufacturer that the firm has negotiated the manufacture of one of the rubber bags for the transportation of oil by aircraft. This is in lieu of 44-gallon steel drums previously used, and the saving in weight and empty backloading will be considerable.

General Extension Service, Statistics of Farm Visits.—Some 4,368 farms were visited by dairy officers for general extension work; including 758 in connection with Dairy Industry Extension Grant Demonstrations and 1,300 in connection with the Herd Production Improvement Scheme. Dairy officers travelled by car 169,000 miles in visiting factories, farms group functions, etc.

General Extension Service, Statistics of Group Activities.—Dairy officers attended 99 field days, 69 film evenings, 28 Agricultural Bureau meetings, and 40 Agricultural Shows for extension purposes.

Dairy Industry Extension Grant

Monetary Allocation for New South Wales.—The 1957-58 allocation to New South Wales under the Commonwealth Dairy Industry Extension Grant was £64,880. This amount was granted for the promotion of improved practices in the dairying industry of New South Wales and was expended on:—

- Grade Herd Recording,
- Farm Demonstrations of Improved Pastures and Silage Making,
- Milking Machine Efficiency Survey,
- Testing Station (Air Flow Meters),
- Punch Card Equipment,
- Publicity,
- Agricultural Trainees,
- Salaries of Organising Officers, and,
- Salaries of Staff engaged in Statistical Work.

Farm Demonstrations.—The statistical position in regard to farm demonstrations is as follows:—

Demonstrations current at 1st July, 1957	132
New demonstrations approved between 1st July, 1957 and 30th June, 1958	152
Demonstrations terminated between 1st July, 1957 and 30th June, 1958	118
Demonstrations current at 30th June, 1958 ..	116

In summary the extension activities in respect of the demonstration farms were as follows:—

Improved pastures sown as demonstrations	1,064 acres
Pastures Renovated and oversown as demonstrations	394 acres
Fertilizer used (excluding lime)	281 tons
Hay conserved	103 tons
Silage conserved	590 tons
Field Days held in association	47
Film evenings held in association	88

The reactions of dairy farming communities to demonstrations of improved pastures with irrigation, and to demonstrations of silage making, were pleasing features of the year's work.

Publicity.—Matter covering herd improvement activities and Dairy Industry Extension Grant demonstrations were published in *Dairy Topics*, the bi-monthly, which has a mailing list in excess of 18,000, and is posted direct to dairy farms throughout the State.

Dairy Industry Extension Grant activities, generally, were also subject to articles in the weekly *Press Copy* and the *Agricultural Gazette of N.S.W.*

Miscellaneous

No. 5 Dairying District—Change of Headquarters.—Headquarters of No. 5 Dairying District was transferred from Moss Vale to Nowra. The district Dairy Office at Moss Vale was closed as from 13th February, 1958.

Establishment of New Dairying District—No. 4A, Parramatta.—A new District, to be known as No. 4A Dairying District, with headquarters at Parramatta, has been established with Mr. J. W. G. Smith as dairy officer in charge.

The district covers the area bounded by the northern boundary of the Wyong Shire, Colo Shire, southern boundary of the Wollondilly Shire and the County of Cumberland area. It comprises an important milk producing area. Decentralised control from Parramatta will yield an effective service to farmers in the area. Six herd recording sub-units are operating in it.

Location of Dairy Officer at Muswellbrook.—In conformity with regional needs, a dairy officer has been stationed at Muswellbrook in lieu of at Singleton. He is operating under the guidance of the District Dairy Officer at Maitland.

Interstate Visits.—The Chief of the Division of Dairying officiated as Judge of the Junior Judging Competition at the Brisbane Royal Exhibition and as Chief Judge of the Guernsey Dairy Cattle Section at the Melbourne Royal Show.

A dairy officer visited South Australia for a Cheese Conference between the Australian Institute of Dairy Factory Managers and Secretaries, the Australian Society of Dairy Technology and the Australian Cheese Manufacturers' Federation.

The Acting Chief and the Acting Deputy Chief attended the Australian Civil Defence School at Mt. Macedon, Victoria.

Overseas Study by Dairy Research Officer.—Mr. G. J. Smith, Dairy Officer (Research), proceeded to the U.S.A. where he has been granted a Research Assistantship in the Department of Dairy Industry at the University of California, Davis Campus. He is specialising in a study of Food Science.

Country Agricultural Society Shows.—Officers of the Division of Dairying attended thirty country shows as Judges and/or Stewards in Dairy Cattle and Dairy Produce Sections.

DIVISION OF ANIMAL INDUSTRY

Some of the notable occurrences were the diagnosis of vibriosis in sheep for the first time in New South Wales; the increase in tuberculin testing; a severe outbreak of tuberculosis at Peak Hill, probably due to infection with the human strain; the development of Aldrin and Dieldrin resistant blowflies; and the first appearance of winter dysentery in cattle.

Veterinary Staff.—The staff position improved following the graduation of six trainees, immediately absorbed, and the appointment of another veterinary officer; although one trainee resigned almost immediately. Two veterinary inspectors were appointed by Pastures Protection Boards, but there were also two resignations.

Seasonal Conditions.—Freight concessions for the carriage of fodder for starving stock were declared in thirty-eight Pastures Protection Districts. Practically no rain of any consequence was received during the first seven months of the twelve. The way stock handled the conditions underlines the part played by the rabbit in past droughts. It is difficult to over-emphasise the great effect of myxomatosis on the pastoral situation.

Diseases Incidence

Pleuro-pneumonia contagiosa.—The outbreaks referred to in the previous year were brought under control, and infection eradicated. Considerable blood testing of cattle was necessary at the close of each of the outbreaks, but the results were worth it. Some of the many reactors detected would have broken down and initiated further outbreaks in susceptible stock. No outbreaks occurred during the year.

Tuberculosis.—In appended statistics (page 51) the numbers of cattle tested for tuberculosis are indicated. They include testing under the Milk Board Scheme; the Tubercle-free Herd Scheme, in Protected Areas and under the Local Government Scheme; and Miscellaneous testing. There was little change, except in the number of cattle tested in the Miscellaneous section. In 1956-57, some 89,000 cattle were tested, resulting in just over 5,000 reactors, an incidence of 5.9 per cent. In 1957-58, the testing almost doubled; 164,422 cattle were tested, and 9,090 reactors were detected; an incidence of 5.4 per cent.

After the introduction of the Cattle Compensation Act in September, 1952, the number of cattle tested increased to approximately 60,000, and has further increased to reach 89,000 in 1957-58.

The tremendous increase in testing this year was due to another factor. This was the introduction of regulations under the Stock Diseases Act to require owners of infected cattle to have the whole herd tested within three months. These measures have been in operation for only five months. Their full effect has yet to occur. This policy change is a big step forward in T.B. control, since practitioners carry out the initial testing and Departmental staff the retesting. It could be the initial step of a T.B. eradication campaign.

In Peak Hill district, an extensive outbreak of tuberculosis occurred among cattle in the Local Government Scheme. It was detected during routine testing; of 60 tested, 32 reacted. At slaughter, lesions were demonstrated in lymph nodes in unusual situations draining superficial structures. Cattle in contact with the above herd, numbering 388, were tested; and 47 gave positive reactions. The lesions were of similar distribution. Later retests detected 17 reactors out of 437 animals tested. Again the lesions were in peculiar situations. Preliminary examinations, at Glenfield, indicated that the Peak Hill outbreak was due to the human strain of the organism. The origin of infection had not been determined at the close of the year.

The human strain was also recovered from an unusual type of lesion in the lumbar and mesenteric nodes of a single animal, amongst a group of reactors, in Wagga district.

In the district of the Veterinary Officer, Newcastle, eradication of tuberculosis in a small area of the Williamstown Peninsula commenced. By the end of the year, all of the 73 herds involved had been subjected to an initial test; about 5,000 head were tested and 150 reactors were detected.

Incidence of tuberculosis in beef cattle is much lighter than in dairy cattle, judging by post-mortem reports of animals slaughtered at abattoirs. Even so, infection can be serious. This was shown by reports this year in respect of two beef herds, one in Moree district, the other in Molong district. In the Moree herd, over 50 reactors were detected in 500 tested; and in the Molong herd 78 reactors were detected in 237 tested, 48 being totally condemned at slaughter.

Blowflies.—After the drought broke it became evident that blowflies were developing significant resistance to Aldrin and Dieldrin. During February and March, and even into April, 1958, reports of blowfly activity indicated that the resistance was fairly widespread in the Armidale, Cootamundra and Orange District Veterinary Officers' areas. Cases were also reported from the area of the District Veterinary Officer, Newcastle, and, later, even from that of the District Veterinary



Tuberculosis Lesion in Beef Cattle Organs, Homebush Abattoir

The Meat Inspection Services are a major public safeguard administered by the Minister for Agriculture and Food Production. The number of cattle on farms tested in 1957-58 increased to 164,000, for 5.4 per cent. reactors; by comparison with 89,000, for 5.9 per cent. reactors in 1956-57. New regulations under the Stock Diseases Act have required an owner of infected cattle to have his whole herd tested within three months

(Photo. from Homebush Office)

Officer, Goulburn. Success with Diazinon was not always achieved, and where this drug failed it was necessary to resort to older methods of control. There was renewed interest in the Mules operation, and in B.H.C. and D.D.T.

Vibriosis in Sheep.—This disease was diagnosed for the first time in New South Wales when abortions in a mob of approximately 17,000 Merino ewes were investigated. The ewes were due to lamb early in August, 1957, and the first abortion occurred about a month before lambing was due. The total number of abortions ran to more than 250, and the outbreak was consequently important to the particular stock-owner. A second outbreak was diagnosed in June, 1958, from the Bathurst district, when over 70 abortions occurred in a flock of 700 ewes. A vibrio species was recovered from specimens submitted in each case to the Veterinary Research Station.

Winter Dysentery.—A severe epizootic of diarrhoea and dysentery in dairy herds in the County of Cumberland and the Camden area was reported. The scouring affected upwards of 50 herds. The majority of the cattle in a herd were affected within a few days of the disease gaining entrance. Cases then tailed off and it took about three weeks to go through a herd. Mortality was extremely low. The worst effect was loss in milk production. This amounted to 30 per cent. to 50 per cent. for a few days, then production built up almost to former levels. Cattle affected towards the end of lactation usually dried off, but the others returned to former levels or almost so.

Initial experiments indicated that the condition was transmissible. At the close of the year further experiments were in progress, to ascertain the type of organism concerned. From the highly infectious nature of the disease and clinical description, the disease seems to have been that which is known overseas as winter dysentery.

Origin of the infection was not determined. Circumstantial evidence tended to incriminate imported foodstuffs. The limited Glenfield trials in this respect were negative. Experimental work at the Veterinary Research Station is continuing.

Infertility in Dairy Cattle.—The position is much the same as in 1956-57. Infertility is still one of the major problems of the dairy industry. Cases investigated in 1957-58 included trichomoniasis, vibriosis, brucellosis, leptospirosis, vaginitis, and those of a non-specific infectious nature.

Arrangements have been made to appoint an officer to investigate the subject in the field. Information accumulated by such an officer in the forthcoming year will be of great benefit to the dairy industry. It is hoped that better diagnostic methods for vibriosis will be available early in 1958-59.

The year's enquiries have confirmed the fact that leptospirosis plays a significant part in abortions in cattle on the north coast.

1. **Trichomoniasis.**—A further big outbreak of trichomoniasis was detected on the north coast in the Tintenbar area; 18 properties were involved. The disease seems to have been in the area for some time. The recommendation envisages frequent rectal examination during the early stages of control, and cessation of breeding activities to allow infection to clear up in the majority of cattle. Information received during the year indicated that it is possible for trichomonads to be carried for long periods in pregnant cattle. Therefore the only safe criterion is for all the cattle exposed to infection to go through a normal pregnancy and two heat periods subsequent thereto. This will mean the use of artificial insemination services where available, or natural services from sacrifice bulls to get cattle in calf as soon as possible. After the last exposed animal is in the later stages of pregnancy, the sacrifice bull can be disposed of for slaughter. This criterion has been adopted in this outbreak. Although it has resulted in some prolongation of the Quarantine Area, it is a far more sound method than that which operated previously.

2. **Vibriosis.**—The causal organism is difficult to demonstrate in specimens from distant centres. Therefore vibriosis is rarely diagnosed. Field evidence incriminates it as a very significant cause of infertility in cattle, particularly on the north coast. Practitioners and Departmental officers continue to report control of infertility associated with abortions in the early and middle stages of pregnancy by the use of Streptomycin, usually as an intrauterine douche subsequent to service. A suggested method of eradication by putting cattle through two normal pregnancies is being examined.

3. **Brucellosis.**—It is evident from the field that brucellosis is still one of the most important factors in dairy cattle infertility. Apparently the Strain 19 vaccine has not been used to the utmost advantage. Increased extension material will be put out in respect of this disease.

Infertility in dairy cattle requires more field investigation. In this direction Departmental officers and veterinary inspectors could be utilised to advantage. To increase the efficiency of field investigations, a Refresher Course when senior veterinary officers next confer on infertility in dairy cattle will advise

them on the latest developments and techniques. Subsequently, district courses would be conducted by the senior officers for veterinary inspectors.

Neonatal Losses in Sheep.—Reports of the District Veterinary Officers, Cootamundra and Orange, indicated that neonatal losses at the autumn lambing were extensive, and attributable largely to the unfavourable conditions during mating and the early stages of pregnancy.

Acorn Calves.—On an Albury property about 20 per cent. of 113 calves dropped from 179 cows were affected with a congenital abnormality; a shortening of the bones of the forelegs particularly, with bowing of the legs, sickle hocks, and a bulldog appearance of the face; seemingly identical with acorn calves as described in the U.S.A. American authorities attributed it to malnutrition during the third to sixth month of pregnancy. Here the subject cattle were involved in drought. The description was circulated to other officers and some additional instances were brought to light, although the percentage of calves affected was much lower.

Ergot Poisoning.—Extension outbreaks of Ergot poisoning occurred following the breaking of the drought in the New-castle, Grafton and Goulburn districts. An interesting case occurred on the north coast when cattle had chance access to the cleanings, i.e., the husk portions of stalk and about 10 per cent. of seed, from harvested *Paspalum* seed; 14 cattle died and a further 16 were affected.

Internal Parasites.—Fluke infestation was a problem, despite the dry conditions during the first half of the year. New infestations were continual in cattle and sheep. The economic loss was considerable, not only from the gross infestation, but also from associated Black Disease in sheep.

Common parasites carried over into the dry part of the year, and as conditions deteriorated the moderate infestations became more important. When the drought broke in the late autumn, ostertagia infestations in cattle and sheep assumed great importance. Standard drenches such as Phenothiazine appeared to have little effect, if any. The Cootamundra District Veterinary Officer arranged for trials of the new substance "Neguvon", an organic phosphate, which had been effective in Queensland and overseas. Results of the trials are not yet to hand, but there was great clinical improvement in the treated stock.

External Parasites.—A slight reversion to arsenical dips for control of lice infestation in sheep occurred, and Aldrin and Dieldrin were used more than in past years. Control of lice infestation improved.

Over the last few years, widespread use of hydrocarbons has led to itch mite infestation. Itch mite infestations were smouldering on very many properties. The chlorinated hydrocarbons have no appreciable effect on itch mite. Consequently, this parasite built up alarmingly. The widespread incidence, the difficulty of diagnosis, and doubt of whether existing treatments actually eradicated the infestation, led to removal of itch mite from the notifiable diseases list.

Ked infestation has ceased to be a problem since the advent of chlorinated hydrocarbon dips.

Couch Grass Poisoning.—Interesting observations were made in the Orange and Armidale District Veterinary Officers' districts after the drought broke. Several mortalities in sheep due to prussic acid poisoning were investigated by inspectors, and blue couch (*Cynodon incompletus*) could not be found in the suspected area. Samples submitted were tentatively identified as ordinary couch grass (*Cynodon dactylon*). Final classification has not yet been made. Appreciable prussic acid was detected in samples of the grass from the suspected area.

Black Disease in Sheep.—In March, 1958, moderate mortalities occurred in sheep vaccinated with a proprietary, Black Disease vaccine in the area of the Cootamundra District Veterinary Officer. The cause was not demonstrated completely, but mortalities ceased after re-vaccination with another organisation's vaccine. Withdrawal of approval for the questioned vaccine is under consideration.

Brucellosis of Sheep.—The Principal Veterinary Research Officer investigated a major infertility problem on a stud sheep property near Leeton. Epididymitis had been introduced to the property with foundation stock in 1949, and in later years the fertility of the flock had been consistently poor.

One-third of the young unmated rams were initially found to be infected clinically. Older and younger rams had not been segregated early. A similar percentage of adult rams was affected. Serological examination by the complement fixation test agreed fairly closely with the clinical findings. Interestingly there have been no serious neonatal lamb losses, and any ewes which lost their lambs were negative to the serological test.

Some of the clinically normal and serologically negative rams simultaneously vaccinated with Strain 19 vaccine and *Brucella ovis* vaccine have developed lesions in the tests four months after vaccination. These rams are at present at the Research Station under investigation. Cultural material from semen collected by artificial stimulation on the property has failed to isolate the organism.

Check-mating at Artificial Stock Breeding Station, Aberdeen.—Detection of the bull affected with trichomoniasis at the above Station during the previous year necessitated the check-mating of all bulls at the Station. This has been done by the District Veterinary Officer. No further case of trichomoniasis was found.

Statistics of Diseases Incidence

1957-1958

Anthrax

No. of Sheep	No. of Deaths	No. of Cattle	No. of Deaths
10,279	33	2,261	44

External Parasites—Sheep

	1957-1958	1956-1957
At Flemington—		
No. Inspected	2,241,732	1,278,950
No. of Pens	31,003	4,098
No. Infested	4,992	5,893
No. of Pens	130	119
Elsewhere in State—		
No. Infested	677,092	754,684
No. of Properties	679	540

T.B.—Milk Board Scheme

Area	No. Cattle Tested	No. of Reactors
Metropolitan	9,295	65
Blue Mountains	435	...
Wollongong	2,349	25
Hunter District	1,558	2
Newcastle	1,234	2
Erina	413	...
Port Stephens	144	1
Upper Hunter	68	...
Totals	15,496	95
	Infection: 0.61%	

T.B.—Free Herd Scheme

Studs			Non-studs		
No. of Herds	No. of Cattle	No. of Reactors	No. of Herds	No. of Cattle	No. of Reactors
35	3,611	2	65	4,408	13

T.B. Protected Areas

No. of Areas	No. of Cattle	No. of Reactors
18	8,788	173

T.B. Local Government Scheme

No. of Areas	No. of Cattle	No. of Reactors
25	9,180	84

T.B. Miscellaneous Testing

Cattle Tested	No. of Reactors	Incidence	
		1957-1958	1956-1957
		Per cent.	Per cent.
164,442	9,090	5.4	5.9

Brucellosis-Free Herd Schemes

Cattle Studs			Swine Studs		
No. of Herds	No. of Cattle	No. of Reactors	No. of Herds	No. of Cattle	No. of Reactors
12	1,536	44	19	394	8
Non-studs					
6	250	7	10	348	2

Trichomoniasis

No. of Outbreaks	No. of Cattle	No. of Properties Released
31	2,162	23

Avian Tuberculosis

No. of New Outbreaks	No. of Properties Released	Districts
10	13	Albury, Wagga, Young, Cumberland, Corowa.

Pullorum-Tested Flock Scheme

No. of Flocks Tested in—	No. of Birds Tested
Class 1 ... 26	59,230
Class 2 ... 28	75,775
Class 3 ... 24	63,292
78	198,297

Brucellosis—Miscellaneous Testing

Cattle		Pigs	
No. Tested	No. of Reactors	No. Tested	No. of Reactors
7,502	1,020	153	4

Cattle Compensation Act

The employment of rangers to Pastures Protection Boards made it possible to attend to diseased cattle soon after the owner had given notification of their presence on his property.

8,241 claims were dealt with during the year. 17,017 animals were involved; total compensation paid out £292,114. 78 per cent. of payments was in respect of tuberculosis; 11 per cent. for cancer; 9 per cent. for actinomycosis; and the remainder was for other scheduled diseases.

Two hundred and ninety-six claims were refused; 294 because the owner had not notified an inspector when the disease in his animals was at an early stage; 15 because the claimants' negligence caused the claims to be outside the allowed 30-day period, and 32 for other reasons. One hundred and seventy-six claims were reduced because they were submitted beyond the 30-day period.

Actinobacillosis was added to the list of compensatable diseases in November, 1958.

Swine Compensation Act

Swine registers maintained by butchers were regularly inspected. In past years inspections of registers in outlying districts have been difficult to maintain. The improvement is due to employment of rangers by Pastures Protection Boards.

Stock Foods and Medicines Act

Early in 1958 veterinary inspectors were authorised as inspectors under this Act, and will be in a better position to take proper action in respect of foods or medicines in their districts.

Complaints relating to stock foods and medicines were followed up. Samples were analysed where warranted and appropriate actions were taken. Large scale sampling was not undertaken, as the analyst was unable to handle large numbers of samples.

One thousand and sixty-three stock foods were registered. For the first time all stock food applications were referred to a veterinary officer for checking. Clerical errors and technical faults had occurred and been repeated in many applications over past years. Correspondence with manufacturers has been undertaken to correct these matters, and liaison beneficial to both sides has been established. Many faults were in respect of information shown on labels. The main label printer now has a list of requirements on which to advise his clients.

One thousand nine hundred stock medicine applications were dealt with. The Stock Medicines Board Secretary resigned as from 21st January, 1958, and a new Secretary was appointed on 2nd June, 1958.

All Vitamin A preparations sold for stock feed were checked. Recommendations by several manufacturers were too low.

Commonwealth Quarantine Act

Because of the danger of introducing Blue Tongue the Federal Government prohibited the importation into Australia of all ruminant animals, as from 31st May, 1958. Warning of this was reflected in increased cattle importations; 84 head were imported from the United Kingdom and 2 from Canada this year, whereas 50 head were imported from the United Kingdom in 1956-57.

The prohibition applied also to semen from ruminant animals, and the last lot of bovine deep-frozen semen left Canada for Australia at the end of May, 1958.

Importation of pigs from Ireland was prohibited on account of actrophic rhinitis. Prior to the ban a pair of Landrace pigs was imported through Sydney; the first imported by a N.S.W. owner.

At the end of the financial year the only animal importations which could be made were dogs, cats, and horses, from Great Britain, Northern Ireland, the Republic of Ireland and New Zealand; and pigs from New Zealand.

Regular importations of animal products were comparable with those of previous years. Of irregular importations, the greatest danger was in salami, other meats, and cheese, brought by European migrants in their baggage; and in eggs and poultry meats brought or imported by Chinese.

Customs Investigation Section detected birds' nests, egg noodles, dried whole ducks, and eggs preserved in mud, on Chinese traders' premises. These prohibited items were seized and appropriate actions were taken in respect of the traders; but the whole served to emphasise that not all prohibited goods were detected on arrival.

Meat Inspection Service

Staff.—At 30th June, 1958, the staff of the Meat Inspection Service comprised the principal veterinary officer, assistant principal veterinary officer, one veterinary officer, two clerical assistants, 120 meat inspectors and thirteen brand boys. Two meat inspectors retired, one died, five resigned, one was transferred to Department of Public Works and the services of one was terminated on account of ill health. Meat inspectors appointed totalled twenty-five. One brand boy resigned, two were dismissed, three were appointed as junior meat inspectors, and six new appointments were made.

The inspector establishment was increased from 120 to 133 to provide for eleven additional inspectors at the State Abattoir and one additional inspector respectively at Wallangarra, Aberdeen, Riverstone, Gunnedah, and Dubbo; whilst three positions were deleted, viz., two for outer metropolitan area circuit inspection and one for city inspection.

METROPOLITAN

Inspection Staff, State Abattoir.—For most of the year the number of meat inspectors was much below the number required for full inspection. Towards the end of the year additional inspectors were appointed. They are now being trained.

Commonwealth-State Co-operation.—In the mutual assistance scheme between the State and Commonwealth Meat Inspection staffs the Commonwealth Meat Inspection Service was unable to supply inspectors when required to make up for shortage of State inspectors, but co-operation was maintained at all Abattoirs where both Commonwealth and State meat inspectors were stationed. At Homebush Bay two or three Commonwealth inspectors regularly inspect beef with State inspectors, and State inspectors frequently assist Commonwealth inspectors on both beef and pork. At most country abattoirs, Commonwealth and State inspectors work together.

Hygiene and Inspection Facilities.—Co-operation with Metropolitan Meat Inspection Board officers with regard to hygiene was maintained. The Board commenced the installation of improved facilities for sterilizing knives and washing contaminated hands of inspectors and Abattoir employees. The methods of cleaning and handling such gear as rollers and gambrels improved. The Board agreed to supply capes and caps to employees unloading meat at the Meat Markets, so that they comply with Pure Foods Act requirements.

Ante Mortem Inspection.—All cattle, other than those slaughtered in the calf unit, were inspected by a senior meat inspector on entry into the lairages. Suspect cattle marked at the Flemington saleyards or consigned direct to the Abattoir were identified so that post mortem results could be obtained.

On ante mortem inspection 145 cattle not previously marked as suspects showed some disorder warranting a special post mortem examination; of these, 85 were affected by actinomycosis or actinobacillosis, 24 by cancer, 2 by tuberculosis, 21 by abscesses, 5 by injuries, 6 by other miscellaneous conditions. No lesion was found in two.

Meat Market Hygiene.—The new market to handle meat introduced into the Metropolitan Abattoir Area commenced operation in July, 1957. Three inspectors re-inspected meat and supervised hygiene there. A high standard of hygiene was maintained with the co-operation of Metropolitan Meat Industry Board officers.

Stock Inspected at Homebush Bay.—The numbers of all classes of stock at the State Abattoir greatly increased. Details of stock slaughtered and inspected, excluding export, are:—

	Cattle	Calves	Pigs	Sheep
1956-57 ..	189,416	105,735	101,882	1,989,363
1957-58 ..	207,401	147,338	119,211	2,289,489

Private Abattoirs, Metropolitan Area.—At the two privately-owned abattoirs and six slaughteryards all meat other than slaughtered for export was inspected by Departmental meat inspectors. At the two Abattoirs hygiene was improved by the repair of chillers, provision of adequate washing facilities, replacement of unsatisfactory barrows, racks, utensils and wash tubs; sealing of unpaved areas in close proximity to meat

handling section, and overall closer supervision by the managements. Close attention was paid to hygiene in pre-wrapped meat sections at both Abattoirs.

Stock Inspected at Private Metropolitan Abattoirs.—Details of stock slaughtered and inspected, excluding export, at the privately owned abattoirs and slaughteryards are:—

	Cattle	Calves	Pigs	Sheep
1956-57	85,579	6,944	16,877	909,592
1957-58	69,311	7,437	15,668	997,008

Saleyards Inspections.—All cattle sold through Flemington Saleyards were inspected by a senior meat inspector. All suspected of disease or requiring special post-mortem examination were recorded and marked and forwarded direct to the State Abattoir for immediate slaughter. Similarly, suspect and reactor cattle consigned to the saleyards on "orders for movement" were recorded and marked to facilitate identification on post-mortem.

At Flemington Saleyards 274,991 cattle were inspected. They included 2,211 positive reactors to the tuberculosis test and 326 suspect cattle, all consigned on "orders for movement". A further 721 cattle not on "order for movement" were marked at the saleyards as disease suspects or otherwise unfit for human consumption.

Cattle sold at private saleyards and clearing sales within the Metropolitan Abattoir Area were also inspected prior to sale. Periodic inspections of pigs sold at the pig saleyards, Homebush Bay, were made by the veterinary officer. Details of stock sold at saleyards within the Metropolitan Abattoir Area are:—

	Cattle	Calves	Pigs
Flemington	274,991	.....	.....
Pig Sales .....	.....	.....	132,538
Private Sales	3,553	3,534	2,019

Knackery Inspections.—At two knackeries in the Metropolitan Area the slaughter of horses and cattle for animal consumption and the spraying of horse carcasses with methylene blue were supervised for Department of Public Health. These are now the only knackeries within County of Cumberland. Details of animals slaughtered are:—

	Horses	Cattle
1956-57	12,313	25
1957-58	13,903	163

Butcher Shop Inspections.—Meat inspectors within the Metropolitan Abattoir Area made 1,258 inspections of retail butcher shops, against meat not branded as required under the Meat Industry Act.

Prosecutions—Meat Industry Act.—Three persons were successfully prosecuted for unclean vehicles and three for unsuitably constructed vehicles for carriage of meat from the meat market. One person was successfully prosecuted for failing to wear a cap while loading at the meat market. Unbranded meat was seized from two butcher shops but legal proceedings have not yet been instituted.

Prosecutions—Cattle Slaughtering and Diseased Animals and Meat Act.—Eight persons were successfully prosecuted for using saliva on carcasses at the Meat Market, to enable an indelible pencil to be used.

Prosecutions—Pure Foods Act.—Six persons were successfully prosecuted by Department of Public Health on information supplied by meat inspectors, for smoking in the Meat Market.

MEAT INSPECTIONS—COUNTRY ABATTOIRS

State meat inspectors inspected at thirteen abattoirs and three bacon factories of the thirty-four premises licensed or deemed to be licensed under the Meat Industry Act for slaughter of meat for consignment to the Metropolitan Abattoir Area. Meat inspectors of the Commonwealth Department of Primary Industry inspected meat for entry into the Metropolitan Area at four abattoirs. At six abattoirs and five slaughteryards and bacon factories meat inspectors employed by local government are authorised to inspect meat for Sydney. At three abattoirs licensed or deemed to be licensed under the Meat Industry Act, no slaughterings were done for Sydney trade.

Details of stock inspected by State Meat Inspectors at country abattoirs, excluding export, are:—

	Cattle	Calves	Pigs	Sheep
1956-57	285,182	360,881	286,946	531,615
1957-58	329,014	369,080	328,658	696,679

TOTAL STOCK INSPECTED BY MEAT INSPECTION SERVICE

The number of stock inspected by State Meat Inspectors, excluding export, is hereunder:—

Place of Slaughter	Type of Stock				
	Cattle	Calves	Pigs	Sheep	Horses
State Abattoir	207,401	147,338	119,211	2,289,489	Nil
Licensed works within Metropolitan Abattoir Area ...	69,311	7,437	15,668	997,008	Nil
Licensed works in country areas	329,014	369,080	328,658	696,679	Nil
Knackeries	163	.....	.....	.....	13,903
	605,889	523,855	463,537	3,983,176	13,903

Disease Conditions Met by Meat Inspection Service

Tuberculosis.—The fall in pig condemnations on account of tuberculosis continued. Incidence of total condemnations has fallen by 5 per cent. since 1953-54. There has been little change in the overall incidence of T.B. condemnations of cattle; although over the past four years a slight fall has occurred despite the greatly increased number of positive reactors to the tuberculin test which have been slaughtered in recent years.

T.B. Condemnations of Cattle and Pigs

Year	Cattle		Pigs	
	No. Condemned	Per cent. of Kill	No. Condemned	Per cent. of Kill
1953-54	4,841	0.87	2,387	0.64
1954-55	5,000	0.87	2,714	0.58
1956-57	4,099	0.72	2,302	0.52
1957-58	4,310	0.77	1,775	0.44

At the State Abattoir a survey of 139,715 cattle, not including suspects or positive reactors to the tuberculin test, revealed 0.43 per cent. with lesions of tuberculosis and 0.09 per cent. totally condemned on account of tuberculosis.

Sites of T.B. Lesions

No. of Cattle	Generalised	Head	Gastro-Intestinal Tract	Respiratory Tract	Carcass Lesions	Total Showing Lesions
139,715	128	139	14	291	30	602
Per cent. of Lesions ...	21.3	23.1	2.3	48.3	5	100

In the 2,211 positive reactor cattle slaughtered at the State Abattoir the distribution of lesions by tuberculosis were as follows:—

Distribution of T.B. Lesions in Positive Reactor Cattle

No of Reactors	Generalised	Head Only	Gastro-intestinal Tract Only	Respiratory Tract Only	Carcass Lesions only	More Than One Site	N.V.L.
2,211	415	240	333	446	54	502	221
Per cent. of Total	19	10.9	15	20.1	2	23	10

Suspect Cattle.—A total of 1,359 cattle, excluding positive reactors to the tuberculin test, were consigned to Flemington saleyards or the State Abattoir as suspects, or detected and marked as suspects at Flemington Saleyards or the State Abattoirs, Homebush Bay.

Post-mortem Findings on Suspect Cattle

Disease	Consigned as Suspects	Detected Ante Mortem	Total
Tuberculosis	10	7	17
Actinomycosis	157	213	370
Actinobacillosis	108	308	416
Cancer	108	60	168
Abscess	46	163	209
Injury	13	48	61
Miscellaneous	21	68	89
N.V.L.	8	21	29
Total	471	888	1,359

Carcass Condemnations at the State Abattoir.—The main conditions for which whole carcasses were condemned at the State Abattoir are listed in the following table:—

Conditions in Carcasses Totally Condemned

Disease	Cattle		Calves		Pigs		Sheep	
	Condemned	Per cent. of Kill	Condemned	Per cent. of Kill	Condemned	Per cent. of Kill	Condemned	Per cent. of Kill
Arthritis ...	...	...	...	...	148	0.12	414	0.02
Cancer ...	43	0.02	5	0.003	...	...	238	0.01
Cyst. bovis ...	1	...	...	...	...	...	...	...
C.L.A. ...	...	...	...	...	...	...	235	0.01
Cyst. ovis ...	...	...	...	...	...	...	34	0.004
Hydatids ...	11	0.005	...	...	67	0.06	25	0.001
Septicaemia ...	96	0.05	24	0.02	198	0.17	148	0.006
Sparganosis ...	...	...	...	...	76	0.06	...	...
Tuberculosis ...	602	0.29	14	0.01	146	0.12	...	...

Sick Pigs Received for Slaughter.—At the State Abattoir twelve pigs were obviously sick when inspected. Nine were destroyed and three died in the yards. The post-mortem showed five affected with necrotic enteritis, four with pneumonia, one with multiple arthritis, and two with non-specific conditions.

Condemnation by State Meat Inspectors.—The following tables list the conditions which caused total and partial condemnations by the Meat Inspection Service. Condemnations of offal are not included as it is not possible accurately to record all of them.

Carcass Condemnations by State Inspectors

Disease	Cattle		Calves		Pigs		Sheep	
	Condemned	Per cent. of Kill	Condemned	Per cent. of Kill	Condemned	Per cent. of Kill	Condemned	Per cent. of Kill
Actino ...	13	0.002	...	...	...	...	...	...
Arthritis ...	8	0.001	19	0.004	401	0.086	1,089	0.027
C.L.A. ...	...	...	...	...	...	...	1,706	0.043
Cyst. Ovis...	...	...	...	...	...	...	107	0.003
Emaciation ...	813	0.134	39	0.007	47	0.010	23,362	0.587
Sarcosporidiosis ...	...	...	...	...	...	...	361	0.009
Septic Condition ...	418	0.069	151	0.029	2,240	0.483	601	0.015
Tuberculosis ...	4,916	0.812	146	0.028	1,459	0.315	...	...
Miscellaneous ...	682	0.113	1,357	0.259	624	0.135	3,633	0.091
Total ...	6,850	1.131	1,712	0.327	4,771	1.029	30,859	0.775

Partial Condemnation by State Inspectors

Disease	Cattle		Calves		Pigs		Sheep	
	Condemned	Per cent. of Kill	Condemned	Per cent. of Kill	Condemned	Per cent. of Kill	Condemned	Per cent. of Kill
Actino ...	7,371	1.217	...	...	...	...	...	...
Arthritis ...	223	0.037	14	0.003	2,002	0.432	4,763	0.120
C.L.A. ...	...	...	...	...	...	...	10,412	0.261
Cyst. Ovis...	...	...	...	...	...	...	...	...
Emaciation ...	...	...	...	...	...	...	...	...
Sarcosporidiosis ...	...	...	...	...	...	...	8	...
Septic Condition ...	269	0.044	13	0.002	771	0.166	589	0.015
Tuberculosis ...	3,785	0.625	19	0.004	10,471	2.259	...	...
Miscellaneous ...	2,071	0.342	52	0.010	3,033	0.654	4,724	0.119
Total ...	13,719	2.265	98	0.019	16,277	3.511	20,496	0.515

Board of Tick Control

ERADICATION CAMPAIGN

Inspection Periods, Kyogle Area and Areas West of Richmond Range.—The policy of twelve months' twenty-one day inspections commenced in April, 1957, and continued. The total numbers of stock examined in the various areas were as follows:—Kyogle, 1,486,377; Woodenbong, 624,412; Bonalbo, 427,271; Tabulam, 722,680; Cheviot, 132,549; and Cullendore, 73,872.

In dairy herds 100 per cent. musters were secured on each round, but on properties with unmusterable country the percentage was deficient. In the areas west of the Richmond

Range the numbers on some rounds were reduced because the stock were too poor to be mustered to the yards. Conditions improved from December onwards and the numbers examined increased.

Infestations—Kyogle Area.—In June, 1957, two infestations had been detected in the Kyogle Area. Subsequently, more were detected in Kyogle, Woodenbong, Bonalbo, Tabulam, and Cheviot Areas.

When the first infestations were detected in the Kyogle Area, Special Quarantine Areas were established. Gates were placed on all roads leading from the areas, boundary fences were patrolled, and restrictions were imposed on movement

of stock. The infested holdings were placed on continuous fourteen-day treatments, as under eradication policy. The actions were taken to restrict possible spread to other areas and to eradicate the infestations detected.

Towards the end of November, 1957, the policy had to be modified. It immobilised too many of the staff. Each holding was then dealt with separately. Continuous fourteen-day treatments were still imposed and stock moving through infested areas were still treated, to protect the remainder of the Kyogle Area. During December, as infestations increased, inspections in the Kyogle Area were on a fourteen-day in lieu of a twenty-one-day basis.

By January, 1958, owing to the very large number of infestations detected, it was no longer possible to continue eradication measures, and the policy reverted to "control". The control measures included treatment of infested herds on a fourteen-day basis for five treatments, and twenty-eight-day examination of all other holdings in the Kyogle Area. This control policy has continued.

Infestations West of the Richmond Range.—West of Richmond Range, infestations were first detected in December, 1957. They are usually found later there than in the Kyogle Area. Most detected during the next three months were along the eastern edge of the Quarantine Areas, close to the Richmond Range. A policy of eradication was continued in the areas of Woodenbong, Bonalbo and Tabulam until the end of March, 1958. Then infestation was too great. A policy of "control" was introduced, with twenty-eight-day examinations until the end of May.

Most infestations in the Tabulam Area were in the northern sector and the northern and southern sections were separated by re-establishing the Tabulam Quarantine Line. Later only two infestations were detected in South Tabulam. It was decided that a policy of eradication should be continued in that area. The infested holdings are receiving fourteen-day treatments. These will continue for fifteen months. Unmusterable country on two properties has again been leased and emptied of stock.

Following initial detection of ticks in areas west of the Richmond Range, the Rivertree, Bookookoorara and Cheviot Areas were re-established as separate units. The boundaries were again patrolled, and gates installed.

In February, 1958, a single tick infestation was detected in the Cheviot Area. No more were found. It was determined that part of the Cheviot Area involved should again be eradicated. Action was taken to lease the infested holding and adjoining holdings, as the country was largely unmusterable.

Of particular interest, the majority of infestations detected in the Kyogle Area and Areas West of the Richmond Range were single tick infestations as indicated in the following table:—

No. of Ticks	Number of Holdings				
	Kyogle	Woodenbong	Bonalbo	Tabulam	Cheviot
1	265	33	16	12	1
2-4	60	10	3	...	...
5-10	8	2	...	1	...
Over 10 ...	16	2	...	...	...

Infestations detected were greater in number than in any one year for the previous ten years; partly explained by the intensive examinations carried out.

Infestations occurred on holdings where none had been observed in the previous ten years. Infestations occurred on all types of holdings, some small and running only a few head of stock and others so large that, during the eradication, treatment of different portions of the holdings extended over several days.

Some holdings found infested were partially leased and a few wholly leased. In these cases, all stock were removed from the leased areas. In some cases following the completion of the eradication, no introductions of stock were made and in other cases stock were introduced subject to three treatments in D.D.T.

Investigations are being made in respect of the possibility of D.D.T. resistance, the possibility of the failure in the actual treatments, and also into the possibility of additional hosts

and greater longevity of the parasite off a host; but no evidence has been produced which would put beyond doubt the reason for failure of eradication in these areas.

Examinations in Rivertree, Bookookoorara and Cullendore Areas.—Inspection of stock during the twelve months failed to reveal any infestation and by the end of June, 1958, these areas had been placed under a period of surveillance. Inspections of stock will be as frequent as possible.

Continuation of Eradication—Boonoo Boonoo Area.—Treatment of stock at fourteen-day intervals continued throughout the twelve months' period. During July and August, 1957, the last of the unmusterable stock on five holdings which had been leased were destroyed.

Infestations in Clean Country—Coombadjha and Grafton.—In February, 1958, four ticks from stock slaughtered in Grafton Abattoir were identified as cattle tick. Unfortunately, the animal or animals from which the ticks were removed could not be traced. Additional staff were moved into the Grafton and Copmanhurst Areas to inspect all holdings from which stock were consigned for slaughter at Grafton.

Early in March, 1958, a single tick was detected on a holding running about 1,000 head of cattle at Coombadjha, about 20 miles north of Copmanhurst.

The infested and adjoining holdings were quarantined. Routine fourteen-day treatments of the infested holding were instituted. The original Copmanhurst Quarantine Area was gazetted. In the next few months 60,000 head of cattle were examined in the Copmanhurst Area but no further infestation was detected.

In April, 1958, an infestation was reported and a second infestation was detected at Lower Southgate, Grafton Area. The holdings were placed under treatment and a special area was gazetted. Investigations of the movement of stock to the infested holding resulted in a further infestation being detected at Clarenza late in April. Detailed examination of adjoining holdings at Clarenza revealed several properties infested in that vicinity and at Lavadia.

On finding of ticks in the Copmanhurst Area action was taken to regazette the Grafton Quarantine Area and after the Southgate and Clarenza detections the quarantine boundaries of the Grafton Area were re-established.

In the Grafton and Copmanhurst Areas by the end of 1957-58 all moving stock were being examined and permits were issued covering all movements. Treatments were imposed on all infested holdings, movements from infested holdings and adjoining holdings were treated, and stock moving to clean country from Grafton and Copmanhurst were treated as from other tick Quarantine Areas. By the end of June the quarantine boundaries of both areas were patrolled and gates were being established. Dips at strategic centres were operating and further dips were in repair. One hundred and twenty men were in the Grafton and Copmanhurst Areas by 30th June, 1958.

DETECTION OF FURTHER ARSENIC RESISTANT TICKS

Richmond Quarantine Area.—In July, 1957, a property at Doubtful Creek was found infested. Several treatments in arsenic dips at seven-day intervals were ineffective. Therefore, two dips were charged with D.D.T. to deal with the problem.

In April, 1958, investigations on a dairy herd at Mummulgum, just east of the Richmond Range, established that arsenic treatments were ineffective. Action was therefore taken to charge a dip with D.D.T.

These two are the first arsenic resistant infestations found within the Casino Section of the Richmond Quarantine Area.

The position at the end of the year was that there were eight pockets of arsenic resistant ticks within the Richmond Quarantine Area; for which, eleven dips have been charged with D.D.T.

Tweed.—It was not necessary to charge any additional dips within the Tweed Quarantine Area with D.D.T. There is some suspicion of arsenic resistance at Highfield and Fernvale, but further observations are necessary. Thirteen dips in the Tweed Area are charged with D.D.T.

OUTBREAKS OF TICK FEVER

Cobaki.—In July, 1957, a suspected case of tick fever was reported at Cobaki. The holding had been previously in quarantine for this disease and released from quarantine in May, 1957. Confirmation was obtained that *Babesiella argentinum* was the parasite. Control measures were applied. No further mortality has occurred.

Theresa Creek.—In September, 1957, two head of cattle died on a dairy farm at the upper part of Theresa Creek, in Casino Section of the Richmond Quarantine Area. Again *Babesiella argentinum* was confirmed. Control measures were applied and a quarantine area was declared. It was the first case of tick fever in the area since 1940.

Duroby Creek.—In January, 1958, a cow died on a dairy farm in this locality and investigations in the field suggested tick fever. *Babesiella argentinum* was confirmed. This property had been in quarantine for three years from January, 1954, to January, 1957, for tick fever. Subsequent to the initial mortality in January, 1954, only one death had occurred and was not suspected of tick fever.

Alstonville.—In May, 1958, a mortality occurred at a dairy farm 2 miles south of Alstonville. *Babesiella argentinum* was confirmed. Quarantine measures were imposed on the holding and an adjoining road which had been used by the infected beast. Previous cases of tick fever occurred in the locality during 1940 and 1944, and one case was in 1957 on a holding 3 miles away.

INVESTIGATIONS

New D.D.T. Formulations.—Trials in Queensland with the Queensland Department of Agriculture and Stock aimed to determine the tickcidal efficiency, and behaviour in the dips, of two proprietary D.D.T. formulations (Timbrol and Nightingale). Under the conditions operating, the two products were found not suitable for eradication purposes, though both provided good control. Deposits of D.D.T. on the hair of treated stock varied considerably.

Methods of Analysis of Hydrocarbons and Organic Phosphates in Dipping Fluids and in Tissue.—The analyst investigated methods of analysis of B.H.C. wettable powders, other chlorinated hydrocarbons and organic phosphates. Considerable work was involved in evolving quick and reliable methods for extraction of non-aqueous solutions of dipping fluids, and determining the D.D.T. and total B.H.C. in dipping fluids, and methods of analysing tissues for presence of B.H.C. and D.D.T.

Analysis of Deposits of D.D.T. on Hair.—Over 900 hair samples were analysed. Many were during the trials of the Timbrol and Nightingale formulations. Others were examined to investigate the D.D.T. deposit on hair of stock treated at four dips in the Casino and Rappville areas where the water was very hard. In three of these dips a pre-mix technique was used when charging the dip. In the fourth a special hard-water rucide was used. All four were depositing satisfactory amounts of D.D.T. on the hair.

Charging Dips with D.D.T. and B.H.C.—In December, three dips were charged with D.D.T. and B.H.C. (Lindane) at the rate of .5 per cent. D.D.T. and .05 per cent. gamma isomer B.H.C. Unfortunately, they were toxic to calves. The dips were recharged, with D.D.T.

Further investigations have been made on the use of D.D.T. and B.H.C. and in the near future certain dips will be charged with D.D.T. and B.H.C., using a commercial grade of B.H.C. containing 6.5 gamma isomer. The dips will be charged at the rate of .5 per cent. D.D.T. and .03 per cent. gamma isomer B.H.C.

Charging Dip with D.D.T. and Diazinon.—One dip has been charged with D.D.T. and Diazinon at the rate of .5 per cent. D.D.T. and .05 per cent. Diazinon. After observation for four months it appears to be satisfactory.

Toxicology of B.H.C. and D.D.T.—Eighty-two determinations of D.D.T. and B.H.C. in tissues were made. Some were in connection with mortalities following the dipping of calves in D.D.T. and B.H.C. under field conditions. Others were samples from calves being dipped at Glenfield Veterinary Research Station, where trials were undertaken to determine a safe level of B.H.C. in a D.D.T.-B.H.C. dip. Considerable variation of D.D.T. and B.H.C. content was found from various animals in different organs. The brain appears to be the best organ to examine as the fat content is more constant.

Wettability Test on Dipping Fluids.—The objective is a method to determine the wettability of dipping fluids. Various dipping fluids have been examined with interesting outcome. A new rucide apparently has greater wettability than an old dirty dip; but a new arsenic dip has less wettability than an old arsenic dip.

Affect of Sunlight on D.D.T.—A small trial indicated that D.D.T. was not depleted by exposure to sunlight.

Production of Cattle Brand Paint.—Three hundred and fifty gallons of cattle branding paint were manufactured at the laboratory. The formulation has been further improved.

ALTERATION OF POLICY EAST OF THE RICHMOND RANGE

Tweed.—The eradication programme in the Kyogle Area having ended, staff have transferred back to Tweed Area. Therefore, a full control policy was again instituted in this section during 1957-58; the policy requiring 28-day treatments of dry stock, and 28-day examinations or treatments of all milking cattle between September and June.

Richmond Quarantine Area.—With the need to continue preparations for eradication, no policy alteration occurred in the Richmond Quarantine Area. Staff supervised 28-day dipping of dry cattle, and inspected dairy herds, as far as possible, from October to June. Activities of the staff resulted in increased stock treated but, as foreshadowed in the report of the previous year, the number of infestations increased in all parts of the Richmond Quarantine Area.

During the early part of the year, staff inspected stock-owners' boundary fences. When the position in the Kyogle Area and Areas West of the Richmond Range deteriorated it became apparent by January, 1958, that eradication for the Richmond Area would have to be deferred. Staff activities were then directed towards the control of infestations within this Area.

When Kyogle Area reverted to "control", the policy of 21-day treatments of holdings in the Nimbin and Casino Areas, adjoining the boundary of the Kyogle Area, was waived. Treatments of holdings on the southern boundary of the Richmond Quarantine Area on a 14- and 28-day basis continued.

OPERATIONS OF FLYING GANGS

Flying Gangs operated in clean country from January to April, in the area south of Boonoo Boonoo and west of the Cheviot Area; 5,858 head of cattle were examined, on thirty-six holdings. No evidence of cattle tick infestation was detected.

In the Grafton and Maclean Areas, two gangs continued operations during July and August, 1957; 4,686 head were examined, on 181 holdings. No infestation was detected. In November, 1957, these two flying gangs were again established in the Grafton-Maclean Area, and operated until the Grafton and Copmanhurst Areas were regazetted at the end of March, 1958. In this period the two gangs examined 25,346 head of stock, on 497 holdings, without finding any further infestation.

COMPENSATION CLAIMS

Seventy-four claims for compensation were paid for loss of stock by death or injury, involving £1,422 6s. 6d.

FENCING

Erection and repairing of fences continued and, as a result, the boundaries have been satisfactorily maintained. In all, 52½ miles of fencing was erected and 152 miles was repaired.

DIP CONSTRUCTION

The dip maintenance gang constructed thirteen new dips within the Tick Quarantine Areas. Twelve were in the Casino Area, in preparation for eradication, and one was in the Tabulam Quarantine Area, for treatment of an infested holding. Also the gang repaired dips in the Grafton-Copmanhurst Areas.

STAFF

It was anticipated that at the end of the dipping portion of the eradication programme the field staff could be reduced from 765 to 630. Because of breakdown of the eradication campaign it has been necessary to retain the greatest number of staff permitted by the funds available. At the close of the financial year the establishment was 732 employees.

ANALYST'S STATISTICAL REPORT

Arsenical concentrate manufactured.....	6,700 gall.
Arsenical concentrate distributed	6,630 gall.
Arsenical dips analysed	8,430
Samples of Arsenical concentrate for manufacturing purposes	67
D.D.T. dips analysed	5,392
B.H.C. dips analysed	10
Water samples analysed in connection with D.D.T. dips	2,210
Cattle dipped in Arsenical dips	1,549,513
Cattle dipped in D.D.T. dips	1,554,587
Cattle dipped in B.H.C. dips	436
D.D.T.-B.H.C. mixtures analysed	41
Paint manufactured	350 gall.

Photostat Apparatus.—It has been evident for some time that a means of copying papers, articles, maps, plans, etc., would be a very useful piece of apparatus to the Laboratory. After examining photostat equipment an improved machine was constructed inexpensively. It will take foolscap size paper and make perfect copies of anything in a matter of minutes. Copies made by the machine are superior in many cases to the original and equal if not superior to work done by more expensive machines.

Queensland Border

TIBOOBURRA SECTION

Constable M. L. Windley was appointed to this Section as Acting Inspector of Stock on 2nd September, 1957; in accordance with an agreement between this Department and the Police Department.

Stock Movements.—Stock withstood the dry season relatively well. Surface water has almost vanished. Most stations are relying on bores and wells.

Most of the Travelling Stock Routes retained fair condition for dry feed, but water presents a problem on some.

Stock moving from Queensland to N.S.W. totalled 4,778; 3,255 through Wompah Gate, 923 through Warri Gate, 600 through Adelaide Gate, and none through Fort Grey.

Four mobs were inspected travelling from N.S.W. to Queensland; a total of 2,100 large stock. Three inspections were made at Wompah Gate, totalling 1,800; and one inspection at a private gate, Toona, totalling 300.

Sheep Lice.—Five properties were inspected. All were clean.

MUNGINDI SECTION.

Stock Movements.—In the dry seasonal conditions, stock movements were considerably reduced, particularly cattle. A great proportion of sheep movement was by transport, owing to lack of feed on routes. The western portion of the Section is still under drought or near drought conditions.

Stock moving from Queensland to N.S.W. totalled 134,710; cattle 30,277, and stock other than cattle 104,433. From N.S.W. to Queensland the movement was 89,080; cattle 460, and stock other than cattle 88,620.

GOONDIWINDI SECTION

Stock Movements.—Drought conditions for the first eight months reduced the number of stock crossing from Queensland.

Stock entering from Queensland appeared healthy, and in much better condition than would be expected in such a prolonged dry spell. There were fewer and lighter lice infestations in sheep crossing to and from N.S.W. Further outbreaks of cattle tick on the Downs and one north of Mitchell in Queensland have caused some concern.

Stock moving from Queensland into N.S.W. comprised fat cattle, 16,318, store cattle 85,288, total 101,606; fat sheep 8,059, store sheep 157,414, total 165,473; loose horses 1,623; total stock 268,702. In comparison with 1956-57 there were 82,882 less cattle, 119,571 less sheep and 749 more horses into this state from Queensland.

Moving from N.S.W. to Queensland; fat cattle 1,946, store cattle 18,472, total 20,418; fat sheep 25,328, store sheep 256,986, total 282,314; swine 225, loose horses 53; total stock 303,010. The variations compared with 1956-57 were 2,905 more cattle, 66,225 more sheep, 27 less swine and 81 less loose horses into Queensland from this state.

Dips.—The number of stock dipped in the four Dips in the Section was roughly half that of 1956-57; mainly due to the dry conditions. All Dips and Yards are in a good condition.

Fencing.—Border fences are now in better repair than in the two previous years when flood damage was a factor. Cultivated land has been extended along both sides of the Border and new fences have been erected at various points. So, the position is much more secure than previously.

STANTHORPE SECTION.

Work within the Section has proceeded smoothly. Stock movements have been well covered. Liaison between this Department and the Queensland Department has been good.

Stock Movements.—Due to the adverse season, there has been little movement of store stock. Most of the stock crossing have moved to Abattoirs.

A considerable number of sheep passing through Wallangarra to Queensland have been fat lambs moving to Brisbane sales from New England and Inverell breeders.

Work proceeded satisfactorily in so far as stock crossing was concerned. Some confusion occurred after the abolition of "Special Areas within Schedule 'T'," with regard to Meat Works cattle, as infested areas within the Schedule affected their treatments. However, the matter was taken up with the Queensland inspectors concerned and the difficulty was overcome.

Bobby-calves moving to the meat works at Wallangarra per motor float from borderline saleyards, e.g. Hayden, have been subject of suspicion. They may have been brought to the sale from holdings within Schedule "S". Since there is no Queensland inspector at Hayden it is difficult to police these calves.

Stock moving from Queensland to New South Wales: Cattle 192,075, sheep 16,822, pigs 53,780, horses 913, total 263,590. Compared with 1956-57: a cattle decrease of 48,869, sheep decrease of 18,686, pig increase of 4,221 and horse increase of 64.

From New South Wales to Queensland: cattle 1,980, sheep 68,693, horses 340, total 71,013. Compared with 1956-57: a cattle decrease of 292, sheep decrease of 25,677, swine decrease of 27, and a horse decrease of 382.

Border Fencing.—Due to the attitude of the Shire Councils concerned and the Land Administration Board, Queensland, it has not been possible to proceed with the proposed new Buffer fence sited on the Queensland watershed. Meanwhile, existing fences continue to deteriorate, through age and the rigours of weather and bushfires.

Approximately a half mile of new fencing and repairs was carried out by Messrs. A. W. Anderson Pty. Ltd., on a section of Border fronting their meat works at Wallangarra. The Department contributed £100 towards the cost.

West of Wallangarra a section of fencing was relinquished and a new line was adopted on the state boundary. The stockowners concerned have now completed fencing and a stock-proof line has been established. Gates affected by this project have been locked, and the keys are controlled by the gatekeeper patrolman.

Sections of fencing west of Wallangarra on the Donnybrook-Limestone and Mingoola patrols are in bad repair and require renewal. These are dog-and sheep-netted fences, but are old and difficult to maintain. Situated in very rough, inaccessible mountain country, it would be difficult to get materials onto the job. Replacement would be costly.

All of the boundary has been constantly patrolled.

Dips and Crushes.—Both Wallangarra and Stanthorpe Dip Yards are in reasonable condition. They are subject to much stress, due to the large numbers of stock dipped. Repairs have been carried out by the staff when and where necessary. Yards have also been twice gravelled during the year. A portion of the Wallangarra Yard is very old and requires renewing. Sawn timber for the job is to hand. Erection will be undertaken by the staff.

An entirely new spraying crush was erected at Wallangarra, and painted.

A site for a sheep dip at the Summit Crossing was inspected and approved. Construction will proceed shortly.

Registered Paddocks.—The position regarding registered paddocks is in general satisfactory. Some difficulty has been experienced on the larger runs in obtaining accurate tallies. During the drought, and also during a flood period, stock died, or were lost, and thus are not accounted for. River boundaries are good; and the back boundaries of the holdings are dog- and sheep-netted, and in excellent condition. Two new registrations were effected.

Glenfield Veterinary Research Station

GENERAL

Area of the Station is unchanged at 600 acres. Sixty-six acres were under cultivation; 60 sown to Belar oats for hay, and six to barley, maize and wheat as green fodder for laboratory animals. The 60-acre oat crop yielded seventy tons of hay.

The positions for research officers under the Pastures Protection Board's subsidy remained unfilled.

Status of the Station as diagnostic and research centre continues to be enhanced. Its value to the livestock industries is widely recognised. Numerous overseas visitors included the Research Station in their itineraries. The discussions were mutually beneficial and have established continuing contacts.

Requests for talks to meetings of primary producer organisations are received in ever-increasing volume. Acceptances are reluctantly curtailed to minimise interference with current research work. Even so the Director of Veterinary Research and other research officers addressed several primary producer conferences and Agricultural Bureau field days.

Field Days.—Two field days were held, one for the Veterinary Inspectors during their Annual Conference and one for delegates to the Annual Convention of the Pastures Protections Boards.

Two groups of Departmental specialist officers visited the Station to observe and discuss current projects in their particular spheres. Livestock Officers (Poultry) were one such group. The other group comprised agronomists of the Division of Plant Industry.

Colombo Plan and F.A.O. Fellows.—No Colombo Plan Fellow was located at the Station this year, but in November, an F.A.O. Fellow, R. D. Katiyar from the Central Sheep and Wool Research Station, Upper Province, India, studied the current experiments on drought feeding of Merinos. Two Yugoslav Veterinarians were to have been located at the Station studying diseases of sheep but owing to lack of funds in F.A.O. the Fellowships were deferred.

Mr. R. Layland, Laboratory Assistant, who had been on loan to the Government of British North Borneo under the Colombo Plan for two years, resumed duty in September, 1957.

VETERINARY DIAGNOSIS SERVICES

Entries in Specimen Register.—1956-57 entries in the Specimen Register were the highest ever for the Station. The 1957-58 total was 4,330 as against 4,910 in 1956-57, a reduction of 580; but an increase of 160 over 1955-56. The total of individual specimens was 33,774; a reduction of 9,989 on 1956-57, but an increase of 9,540 over 1955-56.

The number of individual cattle specimens was 9,969 less than in 1956-57, almost entirely because of the absence of Pleuro-pneumonia.

Sheep specimens increased by almost 100 per cent., mostly due to Itch Mite or *Psorergates ovis*, Ovine Brucellosis and Leptospirosis. A result of the drought was a sharp decline in specimens from suspected Foot Rot.

Pig and poultry specimens were down slightly. Lower incidence of leucosis in poultry, and whether this will continue, are of interest. Incidence of Avian Monocytosis declined but not significantly. Avian Tuberculosis unfortunately showed a marked rise.

Specimens Examined	1955-56	1956-57	1957-58
Cattle	16,083	36,503	26,534
Sheep	867	998	1,824
Horses	37	58	48
Pigs	1,279	1,334	1,140
Poultry	5,161	4,336	3,566
Miscellaneous Animals and Birds	227	236	250
Miscellaneous Other Specimens	580	298	412
	24,234	43,763	33,774
Entries in Specimen Register	4,170	4,910	4,330
Inspections under the Provisions of the Noxious Microbes Act	15	20	20

Publications.—At the close of the year several papers were with Editors of scientific journals. Fourteen papers were published, one in the United Kingdom and thirteen in Australian scientific journals. The papers are listed in Appendix II.

VETERINARY RESEARCH—CATTLE

Artificial Insemination of Dairy Cattle.—Commercial application of artificial insemination in cattle is now completely undertaken by the New South Wales Milk Board, but investigations on techniques continued at the Research Station. The Board's headquarters for artificial insemination are now at Graham Park, Berry, which was officially opened by the Premier in February, 1957. Glenfield has co-operated with the Director of the centre, on test mating of potential sires and various technical problems.

The possibility of milk as a diluent in place of egg yolk-citrate has been investigated. Fresh skim milk appeared slightly superior for chilled storage, when held at 95°C. for 10-20 minutes and cooled rapidly prior to mixing with the semen. Boiled whole milk was inferior to egg yolk-citrate and whole milk unboiled was rapidly fatal to spermatazoa. The addition of glycerol to heat-treated milk was deleterious to sperm at high concentrations. Carbon dioxide bubbled through bovine semen diluted with milk increased the activity of the spermatazoa. In the case of egg yolk-citrate as diluent, the carbon dioxide had the opposite effect. Semen samples have been supplied to the Professor of Veterinary Physiology for his studies of temperature, liquid air and liquid nitrogen effects.

Investigations on different methods of freezing and sealing semen continued. Frozen semen in cracked and leaking ampoules are spoiled and valueless if packed in dry ice and alcohol, but not when packed in dry ice alone. When first opened the latter appeared devoid of live sperm, but a few minutes' exposure to air after thawing reactivates the sperm.

Bovine Trichomoniasis.—The search for a culture media which will provide optimum growth and maintenance of *T. foetus* continued, particularly for confirmation of the condition when detected in the field. A medium of saline and sucrose 1 per cent. has shown considerable promise.

The viability of *T. foetus* in material from pyometron cases is being studied. It has persisted for up to thirteen days.

Vibrio foetus.—A strain of *V. foetus* recovered from a cow three days after abortion has conformed biochemically and culturally to the Group III Terpstra Strain. It is H₂S and catalase positive and reduces nitrates to nitrites. Thus it conforms both to the pathogenic and non-pathogenic strains of *Vibrio*. The cow from which the strain was recovered was in a herd known to be infected with Trichomoniasis. The strain agglutinates with Longdown strain of *Vibrio*, but not with 1980.

Infectious Papillomatosis.—Histological evidence is accumulating that the papillomatous condition, or "warts" on the udders of goats, frequently tends to malignancy. In several instances there has been no response to bismuth salicylate or antihistamine. In the stud at Condobolin there has been no response to autogenous vaccine.

Effect of Tranquiliser Drugs on Cattle.—Chlorpromazine or largactil has been shown to be of considerable value. Intractable cattle become docile and remain so, enabling handling to be undertaken with minimum restraint.

Eye Cancer in Herefords.—A systematic histological survey has commenced. The Hereford breed appears to be susceptible to various forms of neoplasm on the eye structure and orbit. Many of these may be malignant, but as yet insufficient material has been examined for conclusions.

Bovine Tuberculosis.—Considerable tubercular material from bovines has been examined and typed, e.g., human, bovine, or avian strain.

An outbreak of particular interest occurred in cattle in the Peak Hill municipality. The herd had grazed a paddock which adjoined a night soil depot, and the cattle watered from a small dam, the catchment of which constituted the drainage from the night soil area. Of 388 cattle subjected to the tuberculin test forty-seven gave a positive reaction, and lesions of tuberculosis were detected in thirty-four of these. The lesions were mainly restricted to lymph nodes draining superficial areas. The human strain of *M. tuberculosis* has been recovered from the lesions. Comprehensive cultural and biological examination of lesions from a further six cattle which had been autopsied have substantiated that the infection is due to the human strain of *M. tuberculosis*.

Acetonaemia in Cattle.—Co-operatively with University of Sydney Veterinary Clinic at Badgery's Creek, the prepared Acetest tablet has been demonstrated as very suitable for detection of Ketonaemia. Interpretation is easier than with the more highly sensitive Rothera's Test.

Hypermagnesaemia of Cattle.—In a pilot trial of the effect of dolomite, on highly improved pastures, at Kangaloon, the very dry autumn resulted in negligible pasture growth and total absence of cases in dairy cattle.

VETERINARY RESEARCH—SHEEP

Carbon Tetrachloride Poisoning of Sheep.—Methods for assessment of the functional state of the liver and kidney have been developed and are being applied to cases of carbon tetrachloride poisoning in the field following the usual therapeutic administration of 1-2 ml. of the drug. These techniques are also being applied to normal sheep in which toxicity has been induced by excessive doses, 40-80 mls. The experiments aim to define the functional pathology of the condition.

Aspects of the metabolism and excretion of carbon tetrachloride in sheep, and the predisposing factors which must be operating when mortalities occur after normally safe doses, are also being studied.

Ovine Brucellosis.—The disease has been confirmed in Dorset Horn, Cheviot, Southdown and one Merino rams. The findings to date suggest that the disease is not widespread in the Merino flocks of this State. Epididymitis has been seen in Merino rams which have proved negative to *Br. ovis* infection both by serological and cultural methods. In some British breed stud flocks the disease shows high incidence with resultant low lambing percentages and ram wastage. In one stud 33 per cent. of young unmated rams were affected. The disease appears to be confined to the rams. There has been no evidence of *Brucella* abortions in the ewes.

An experiment has been commenced aimed to evaluate vaccination using the New Zealand technique and *Br. ovis* adjuvant vaccine simultaneously with Strain 19 *Br. abortus* vaccine.

Use of the vaccine has the disadvantage of producing a positive complement-fixation titre indistinguishable from the reaction obtained with natural infection. Knowledge of many aspects of this disease is lacking. When a Research Officer under the Pastures Protection Boards' subsidy is appointed during the coming financial year the research will be intensified.

Ovine Vibriosis.—On two occasions vibrios have been recovered from outbreaks of abortion in ewes. This condition has not been encountered previously in N.S.W. In each instance the abortions occurred late in pregnancy. A striking feature of one of the outbreaks was that in 50 per cent. of the foeti examined there was very distinct necrotic foci on the liver. Larger foci presented a target-like appearance, with red centres surrounded by a zone of congestion. Vibrios could not be demonstrated in the abomasa. They were recovered only from the liver lesions.

Fascioliasis and Black Disease of Sheep.—After the drought broke, early in 1958, the highest number of outbreaks of Black Disease for the past twenty years came under notice. The gross pathology was characteristic of Black Disease and associated with extensive fluke damage to the liver parenchyma.

Neo-Natal Death in Lambs.—Losses in lambs during the first seven days were higher than usual, due to a variety of factors. An intense investigation was undertaken on a Goulburn property, where a high percentage of lambs were unwilling to seek sustenance from their mothers and died within the first few days. The aetiology was not determined but hypoglycaemia in the lambs was marked. This accounted for the debility. Parenteral administration of glucose produced a dramatic response in the lambs, but unfortunately it was usually only temporary.

Coccidiosis in Sheep.—Studies have been undertaken to identify individual stages in the coccidial life cycle in sheep. In the Armidale district, *Globoidea* are commonly found associated with ovine clinical coccidiosis. Stages of sporogenous development are readily identified, but those of schizogony are not. *Globoidea* may in fact be part of the life cycle of coccidiosis. Lack of knowledge regarding the species of coccidia involved and the detailed life cycles of the various species prevent critical identification and interpretation.

Dwarfism in Sheep.—Investigation of the genetics of dwarfism in sheep was concluded, as the "dwarf" ram proved infertile. A comprehensive record of the skeletal development of the dwarf sheep was compared with normal sheep of the Dorset breed.

L. Thyroxine and Wool Growths.—Using mice, the effect of L. thyroxine on the female was studied for a period. When administered by subcutaneous injection and by mouth, conception rates were lowered and maternal deaths were higher. The reproduction ratio was lowered significantly. Food intake was increased but, after an initial rise, body weight fell rapidly. Indications were that the reactions were only temporary, as normal reproductive activity resumed when administration of the thyroxine ceased.

Urinary Calculi in Sheep.—Implants of calculi within polythene envelopes were made into the bladders of ewes treated with 15 g. of ammonium chloride daily per mouth. The calculi did not dissolve over a period of two weeks. The urine became more acid and in one case encrustations of silica formed on the implant, associated with albuminuria and kidney trouble. Urine from sheep carrying siliceous calculi tend to a low pH.

Wethers in metabolism cages were fed rations containing oxylates, to see whether there was any connection between calculi and feeding of oxylate rich plants, as seen at times in the western districts. Intakes of up to 0.49 grammes of sodium

oxylate per kilogram body weight were fed, and later increased to 1.09 gram per Kg. body weight over a period of twenty-one days. The basal diet consisted of lucerne 40, oats 40, crushed oats 18, bonemeal and salt 2. Serum calcium and urinary calcium were unaffected and there was no evidence of albuminuria or calculia formation.

Analyses of calculi submitted by field officers continued to show calcium and magnesium, from grazing flocks, and sil from stud and housed sheep.

VETERINARY RESEARCH—PIGS

Meningo-Encephalitis of Swine.—This pathological condition, associated with marked eosinophilia, is frequently observed in pigs suffering from sodium chloride poisoning. In a mortality involving ten pigs, the typical nervous syndrome was seen; with characteristic lesions of the central nervous system. Source of the poisoning was probably mill waste which was being fed. The toxic principle was probably contained in the baking leaveners.

VETERINARY RESEARCH—POULTRY

Simultaneous Vaccination against Infectious Laryngo Tracheitis and Fowl Pox in Chickens.—The effect of this simultaneous vaccination of chickens is under experiment. Eight groups of chickens have been employed, using commercial vaccines from firms registered under the Stock Medicines Act of N.S.W.

Two groups have been vaccinated with I.L.T. vaccines A and B, two groups with Fowl Pox vaccines A and B, two groups have been simultaneously vaccinated with I.L.T. vaccine A and Fowl Pox vaccine B and I.L.T. vaccine B and Fowl Pox vaccine A, and two groups have remained unvaccinated. Good "takes" occurred in all vaccinated groups. A natural outbreak of I.L.T. with fairly heavy mortality occurred in the two non-vaccinated groups and the two Fowl Pox groups. Odd cases of natural Fowl Pox occurred in the two non-vaccinated and two I.L.T. groups.

Ten weeks later, two birds from each group were challenged by vaccination, by intratracheal method, with I.L.T. virus. All except the four birds from the two non-vaccinated groups developed acute I.L.T. The four non-vaccinated birds had apparently recovered from natural infection and remained immune.

The finding also suggests that the immunity following vaccination is of short duration. The experiment indicates that cross infection occurred between the four different vaccines housed in separate divisions of the one brooder. The investigation is being continued by using one I.L.T. and one Fowl Pox vaccine at a time.

Avian Monocytosis.—One hundred and ninety-three outbreaks of Avian Monocytosis were investigated, involving examination of 723 birds. One outbreak occurred in turkeys and two in ducklings. Of the chicken outbreaks, 93 per cent. were in birds between one and twelve weeks of age. The peak was in the four to six weeks age group. The ducks were one to two weeks old. The disease is widespread. High energy rations seem to be involved in the majority of cases. A good response is obtained from starvation, reduced protein in the mash, and molasses in the drinking water. Terramycin at the rate of 50 lb. per ton of mash is also effective. Few outbreaks have failed to respond to this treatment.

Encephalytic Syndrome in Ducklings.—This has been encountered in ducks up to eight weeks of age. Onset is sudden, and fatal in one and a half to two hours. The birds are haunched and there is shivering of the head and wings, sometimes of the whole body. The disease has not been transmitted with various body tissues and bacteriological examination has failed to reveal any infective agent. Mortality, which may reach 20 per cent., has been stopped by high level feeding of Terramycin in the mash.

Corynebacterial Infection of Budgerigars.—An outbreak involving several hundred Budgerigars, with 60 per cent. mortality, occurred in a breeder's aviary. The birds would not eat, had ruffled feather appearance, and died overnight. There was marked cirrhosis of the liver, and a corynebacterium was recovered from the liver and blood. Upon inoculation this organism proved fatal in twenty-four hours.

Source of infection proved to be cuttle fish; fed to the birds. The same organism was recovered. It is a toxin producer. Further studies are in hand.

Nutrition Research from Glenfield Laboratory

SHEEP NUTRITION

Sheep Drought Feeding Research.—Another series of projects have been completed in the Burdekin Unit in co-operation with the C.S.I.R.O. Division of Animal Health and Production. Emphasis has been in respect of factors affecting the utilisation of low quality roughage under pen conditions.

The basal roughage was wheaten straw chaff containing 2.5 per cent. crude protein. It was fed to similar groups of equal numbers of two tooth Merino ewes and wethers. Nitrogen supplementary to the basal ration was provided in linseed meal, peanut meal, coconut meal, cottonseed meal, meat meal, lucerne chaff and linseed meal or lucerne chaff plus wheat; plus urea-sulphate mixture providing 5.0 g. nitrogen per head per day. All supplements were fed at twice weekly intervals. There were two unsupplemented control groups. These failed to survive after fourteen weeks in the experiment.

Results showed that supplementary nitrogen to improve sheep utilisation of low quality roughage may be supplied as palatable protein concentrates, or as urea added to high energy-low protein concentrates such as wheat or oat grain.

A second series of experiments was commenced in November, 1957, to study the effect of roughage quality on sheep performance and to investigate further the value of urea as a source of supplementary nitrogen. Urea was fed at three levels to different groups. During the first four weeks, twenty-one sheep succumbed from urea poisoning. The main cause appeared to be the rate at which the sheep consumed the wheat-urea-sulphate mixture. Deaths occurred from as little at 12 per cent. and after 24 per cent. when given in one feed; but when the supplement was mixed with 3-6 lb. roughage the rate of eating was markedly diminished and losses ceased even though up to 36 g. of urea was given in one feed.

PIG NUTRITION

Early Weaning of Pigs.—Results of an experiment determining a simplified pre-starter and starter diet for piglets have been compiled as an article for the *Agricultural Gazette of N.S.W.*

POULTRY NUTRITION

Toxicity of Meatmeals.—Some batches of meat meals contain factors toxic for growing chickens but adult birds are not affected. Investigations are in progress to extract and identify the toxic factors.

Methionine in Broiler Diets.—An experiment has shown that methionine supplementation up to 0.1 per cent. of the diet, continued to twelve weeks of age, is economic. The response is better if extended to twelve weeks rather than ended at eight weeks. The industry would be well advised to adopt this finding.

Fat in Broiler Diets.—In conformity with American results, fats were found to improve feed efficiency but not to effect bodyweights. Vitamin B supplementation was not required.

Early Growth Rate and Egg Production Projects.—These projects were concluded. The data collected cover the weights at various ages, sex maturity, egg weights throughout the experiment, egg production during first and second laying seasons, length of winter pause, and mortalities. Analyses of the data have not been completed.

Antibiotics for Layers.—Terramycin fed at the rate of 50 gm. per ton did not increase egg production when high. It is worthwhile when production is low.

EGG QUALITY INVESTIGATIONS

Cracked Eggs from Hens in Cages.—This problem has been resolved. Cages designed with less rigid floors and high gauge wire would largely overcome it.

Yolk Pigmenting Substances.—Several synthetic carotenoids have been tested as yolk pigmenting substances. They were satisfactory except that they would be too unstable for commercial use.

Oiling Eggs.—Oiling of eggs at high atmospheric temperatures, to prevent albumen quality decline as a result of carbon dioxide loss, is being studied. Early results are promising.

MISCELLANEOUS VETERINARY RESEARCH PROJECTS

Myxomatosis.—The general study on the epizootiology of Myxomatosis has continued. The year having provided probably the driest period in New South Wales for over ten years.

some interesting facts emerged. Not the least was the manner in which sheep, which graze closely and obtain quantities of legume burr, came through the dry period; whilst cattle showed pronounced malnutrition. Previously the legume burr, a valuable dietary factor, was consumed by rabbits during dry periods. In some districts the unprecedented position, exhausted water supplies but adequate dry grazing, was seen.

Rabbit Population.—For the calendar 1957 year, 521 tons of rabbit skins were sold in Sydney as against 279 tons in 1956; an 80 per cent. increase but still strikingly less than in the pre-myxomatosis years, when sales exceeded 3,000 tons. The trend in the rabbit skin trade in Sydney for the first six months of 1958 shows less skins for sale than in that period of 1957.

Distribution of Doses.—The standard laboratory strain of Myxomatosis virus has been maintained, and supplied to Pastures Protection Boards and primary producers on request. The number of requests for virus amounted to 661, a little less than in 1956-57; 6,097 ampoules of virus were distributed, comprising 152,425 infecting doses of virus.

Northern Tablelands Epizootic.—There had not been an epizootic of Myxomatosis on the northern tablelands since the summer of 1954-55, and it is of interest that at the close of 1957-58 the disease was very active at Glen Elgin in the Glen Innes district and at Ewingar on the Upper Clarence.

Attenuated Field Strains.—Development, in the field, of four attenuated strains of Myxomatosis, all with low killing power, resulting in good recovery rate and immunisation, stimulated an investigation as to the percentage of recovered and immune individuals in the rabbit population. Random samples of rabbits from a few districts indicated that approximately 10 per cent. of the rabbits in the State are resistant to Myxomatosis.

Silage Investigations.—The investigations on silage conservation have concentrated on the experiment silos at Wollongbar Experiment Farm.

The experiments aimed to determine the lactic acid development and palatability to dairy cows of Kikuyu grass ensiled at various stages of growth, early, medium and mature. The material was "put down" over the February-April period. Temperatures within the silo were recorded by the use of thermo couples, and ranged from 80-85° F.; well below those recorded for good silage in older countries.

As in 1956-57 the lactic acid did not approach the desirable 1 per cent. level or higher on a wet matter basis. The values ranged from 0.07 to 0.65 per cent., with pH from 4.5-5.6.

TOXICOLOGY RESEARCH

Nitrogen Poisoning of Stock.—Investigations were commenced to determine the reliability of the Diphenylamine Blue test for detecting nitrate and nitrite ions in blood and serum and thus supporting or eliminating nitrogen poisoning of stock. The test detects methaemoglobin in the circulating blood.

Toxicity of Urea for Sheep.—Urea is gaining momentum as a protein supplement in stock feeding. It is under critical examination in the Burdekin Unit experiments.

If consumed rapidly, even at low levels, a fatal syndrome develops within a short time. Administered to sheep by stomach tube, as little as 8 to 12 grams will induce symptoms and death. Taken by the mouth, levels between 12 and 24 grams in one feed produce toxicity and increase blood ammonia from 10-15 micrograms per ml. of blood. Urea promises to be an excellent nitrogen substitute in animal rations, being cheap and readily available. The work is in progress to ascertain an antidote to eliminate the possibility of toxicity.

B.H.C.-D.D.T. Toxicity in Calf Dipping.—In a series of dipping trials at the Glenfield Station the calves were dipped weekly after exercise, in varying concentrations of gamma isomer B.H.C. and D.D.T. mixtures, with the addition of wetting agents. Concentrations of gamma isomer B.H.C. between 0.07 and 0.05 per cent. and 0.5 per cent. para-para isomer D.D.T. regularly induced an epileptiform syndrome. Calves dipped at 0.5 per cent. para-para isomer D.D.T. and 0.03 per cent. gamma isomer B.H.C. showed only a tremor syndrome.

Stock Poisonings by Inorganic Compounds.—Over 500 analyses were made in diagnoses and research. The number of livestock lost through poisoning and ignorance of owners continues to mount. This year thirty-seven separate mortalities comprising 103 head of cattle, 522 sheep, 130 turkeys, 31 fowls and 1 horse were confirmed as arsenical poisonings. Fourteen mortalities comprising 62 cattle and 2 dogs were confirmed as lead poisonings. Lead based paints were a common source.

Shannon Vale Nutrition Station

Pastoral conditions on Upper New England were the most difficult for 20 years past.

At the close of 1957-58 the Station was carrying some 2,000 sheep and lambs: 250 of the latter to be marketed at an early date. Intestinal parasitism was severe in late summer, requiring constant treatments.

A further 30 acres of pasture have been sown on virgin land, and 16 acres of a paddock originally sown more than 10 years ago were resown. Topdressing of the whole area with superphosphate at 2 cwt. to the acre has been completed.

Grazing Comparisons.—The experiment in which sheep grazed full time on sown pastures are compared with sheep grazed $3\frac{1}{2}$ days per week on sown pastures, and $3\frac{1}{2}$ days on natural pastures, continues to yield interesting information. It has been in progress several years and will end during the coming year after the present weaner ewes have lambed. In the full-time sown pasture group, the grazing rates of ewes during the winters of 1956 and 1957 were eight to the acre.

Segregated Species Trials.—These had to be suspended temporarily, because of no rain during the spring and summer.

Time of Lambing Experiments.—Seventy per cent. lambing commencing at the end of December meant in fact a mid winter mating.

Post Mating Nutritional Treatment.—The experiment did not proceed to schedule, due to absence of rain and the reduced pasture growth. There was no difference between the sudden and gradual reduction in nutrition groups. The group supposedly on a rising plane of nutrition towards the latter part of pregnancy showed 7.5 per cent. increased lambing over the two other treatments.

Fat Lamb Breeding Experiments.—The Romney and Romney x Cheviot ewes mated to Southdown rams gave 91 per cent. lambing.

Annual Field Day.—Held on 3rd October, 1957, it attracted sixty pastoralists.

Trangie Agricultural Experiment Station and Wool Research Laboratory

Mr. R. B. Dun, who had been on two years' study leave for a post-graduate course in animal genetics at the University of Sydney, resumed duty at the Wool Laboratory as acting Officer-in-Charge.

The winter annuals failed to germinate in the dry conditions and supplementary feeding of pregnant ewes was necessary. Dry sheep were not fed and maintained condition. In spite of lack of soil moisture, grazing lucerne grew well and provided an excellent stand-by from September to November. Heavy rain occurred in December, 1957, and again in February, 1958, but excessive heat and drying winds followed. Autumn pastures were only fair. Good rain in May and June, 1958, established good winter grazing.

Breeding Experiments.—The best results so far attained by mating by artificial insemination were obtained from 475 ewes inseminated in March, 1957; 89.7 per cent. of ewes lambed, 98.7 per cent. of lambs were mothered, and 90 per cent. of lambs were marked. At the 1957 spring mating, 1,313 ewes were inseminated; 60.2 per cent. of lambs were mothered and 51.4 per cent. lambs were marked. Attempts to flush the ewes before insemination were obviously handicapped by the inadequate pastures.

Single Character Selection Groups.—The projects, involving ten groups, continued. These groups are compared with the Stud and Selected Demonstration Flocks. The Stud is selected on visual appraisal only. Results have been similar to previous years.

The Selection Groups show clear differences and indicate the high heritabilities of the characters concerned.

In contrast, the comparisons show for the Stud and Selection Demonstration Flock results which differ widely from those obtained in the previous year.

The random autumn flock has $2\frac{1}{2}$ times the average fold score of the random spring flock. These two flocks may not be strictly comparable, due to sampling. In future an interchange of sires between the two flocks will be made, to ensure genetic homogeneity.

Some of the data from these Groups have now been analysed and comparisons made between the following flocks:

- (i) Nucleus and Fleece minus.
- (ii) Fleece plus and Fleece minus.
- (iii) Crimps minus and Crimps plus.
- (iv) High nutritional plane and Low nutritional plane.

Wool weight per unit area accounted for nearly all the fleece weight difference in the first three comparisons; fibre density being very important.

High level nutrition produced a large increase respectively in fibre diameter, staple length, and body weight. The increased fibre diameter did not produce any change in crimps per inch.

Comparisons between the "Folds plus" and "Folds minus" Groups showed that Fold score is an important component of reproductive capacity. Between 1953 and 1957 the fertility of the "Folds plus" ewes was poor compared to "Folds minus" and was higher than the Random Group.

Association of Poll Gene with Fleece Character in Merinos.—Analyses of the data of three years' comparisons of polled and horned progeny of heterozygous poll rams have commenced. Rams and ewes have been treated separately. The polled rams cut 5.99 per cent. more greasy wool than the horned rams, while the polled ewes cut 4.47 per cent. less clean fleece weight than did the horned ewes.

Comparison of the genotype-sex interaction showed highly significant interactions in greasy fleece weight, clean fleece weight, and body weight. The clean fleece weight differences were due to differences in body weight and staple length.

Importance of Poll Characteristics.—Matings between heterozygous poll rams and knobbed ewes showed a 1:1 polled-horned ratio in both ram and ewe progeny. In the ewe, the detection of homozygosity seems impossible, as both homozygotes and heterozygotes have depressions at the horn sites. This may not be the case in rams. Studies are continuing on the fertility of homozygous and heterozygous poll rams.

Sheep Nutrition Experiments.—Owing to the high incidence of Foot Rot in 1956, this experiment had been temporarily suspended. Over the last year observations on these ewes were resumed. The experiment commenced in June, 1953. It will continue until the ewes die. Thus it will yield information on age effects on fertility and wool production.

In the low plane group the ewes are now 3.6 lb. lighter in body weight than those in the high plane group. It means that the low plane group have made up 30 lb. depression of bone, muscle, and fat which occurred in the first year. At shearing in 1957, the high plane cut 0.21 lb. more clean wool than the low. In 1954, this difference was 2.41 lb.

Wollongbar Experiment Farm Nutrition Research

The research programme continued and good progress is reported. The silage investigations, undertaken by the Special Veterinary Research Officer, Mr. McBarron of Glenfield, in co-operation with Mr. Holder of Wollongbar, are reported elsewhere in this report.

The generosity of north coast producer organisations made possible Mr. Holder's visit to New Zealand in November and December, 1957; to visit research centres in the North Island where production studies are in progress in the dairy and pig industries. The personal contact established with research workers in New Zealand will prove invaluable to Mr. Holder in the future.

Vetch Grazing Trial.—Further experiments on the grazing value of vetches have been undertaken; to determine the production effect on cows grazed solely on vetch, by comparison with cows on native grass during winter, and to ascertain whether vetches grazed before maturity would regenerate. Twenty-eight cows were used in this experiment.

Grazing of immature vetches was shown to be not economic. It lowers the dry matter yield by up to 50 per cent.

Production from cows grazing vetches was more than 1 lb. of commercial butter higher than the other group. The latter grazed 13 per cent. longer each day than did the vetch group.

Calf Rearing Experiment—Skim Milk Feeding.—This was conducted over the November-January period; to determine the effects, on health, and growth rate, of calves deprived of whole milk at two weeks of age and fed separated milk and "Vetemul A and D" or separated milk only. These groups

were compared with calves reared under good average conditions, e.g., whole milk to six weeks of age and separated milk thereafter.

The calves in the separated milk groups were more inclined to scouring and pneumonia and two calves receiving Vetemul succumbed to pneumonia and empyema. The "normal-fed" calves showed faster growth rate and were in better health. At six months the survivors of the "separated milk" groups were only slightly behind the "normal-fed" group in body weights.

Overall, the results indicated that the saving in whole milk in the early period of rearing did not compensate for the losses or the additional care needed in safeguarding health.

Vitamin A Supplements for Pigs.—These investigations continued. A replicated experiment to compare growth rate and feed consumption of pigs fed a stabilised vitamin A supplemented meal, with pigs receiving the meal ration not supplemented, has been conducted.

Results varied. Differences occurred between replicates due to the varying Vitamin A status of the individual pigs at the commencement of the experiment. Pigs deprived of Vitamin A during suckling and the immediate post-weaning period, showed diminished growth rate and poor food conversion efficiencies as they approached bacon weights.

Symptoms of Avitaminosis A are corrected immediately Vitamin A therapy is instituted.

Restricted Feeding of Pigs.—The bacon trade throughout the world today down-grades baconers which are over fat. High quality lean bacon is in demand. At Wollongbar the piggery is stocked with Tamworths, and studies have been in progress to ascertain the effects, on growth rate, and carcass quality, of restricting feed intake during the period of growing from 115 lb. to 165 lb. body weight. In all, eighty-two individual pigs have been used in this investigation.

Conflicting results have been obtained. Overall, they have shown that growth rate is not too drastically reduced over the growth period concerned when feed intake is at 4 lb. meal per day. There is a definite improvement in carcass quality on local bacon factory grading. This year's results have shown that 4½ lb. meal per day produces over fat carcasses.

Milk-meal Feeding Experiment.—This experiment commenced in March, 1958. It is to examine the effects, on growth rate, and feed conversion efficiency from "store" to bacon weights, of various levels of milk combined with meal. The experiment commenced with two replicates of meal feeding, compared with meal plus a maximum of 1 gallon of milk per day.

The results have shown that although this volume of milk yields similar energy and protein intake to that of the wholly meal-fed pigs, it significantly increases growth rate and improves feed conversion.

Creep-feeding Trials.—Recording the average consumption of creep feed by litters has continued. Observations on fifty-three litters have shown a straight line relationship between consumption and weaning weight at eight weeks. Milk production of the sow has little effect on ultimate weaning weight. There was a highly significant increase in weaner weight of litters where 4 per cent. of dried buttermilk protein was added to the ration.

Grafton Experiment Farm Pig Feeding Trial

Brewer's Grain in Pig Diet.—The fourth feeding trial on the value of brewer's grains in the diet of pigs was concluded. Mr. Mylrea has completed an article, at present with the publishers, covering the results of the four trials.

Condobolin Experiment Farm Sheep Breeding

Fixation of the Border Leicester x Merino.—The third generation of this cross was lambled in the autumn of 1958. The lambing percentage was lower than in previous years, due to the severe drought conditions prevailing at the time of mating. The earlier F1 generations have been heavily culled and the results of the F2 generation will prove of interest.

Poultry Experiment Station, Seven Hills

Mr. R. Beilharz, B.Sc.Agr., was appointed in January, 1957, to the position of livestock research officer, which has long been vacant. Mr. M. W. McDonald, B.Sc.Agr., continued post-graduate studies at the University of Sydney but later resumed duty full-time at the Station.

Research Programmes—Genetical and Nutritional.—In the genetical research programme the biochemical interactions with breeds of poultry continued under study. Analyses of the cysteine content of blood and liver of White Leghorn, Australorp and their crosses have revealed that the crosses vary less in the cysteine contents of their tissues than do the parent breeds.

In the nutritional research programme investigations continued on the production of a basal diet low in folic acid.

Studies of the calcium metabolism of the White Leghorn and Australorp have revealed that the crossbred is more efficient in its calcium metabolism than are the parent breeds.

Recurrent Reciprocal Selection.—This programme has been continued and third generation selections have been made. The programme takes in eighteen White Leghorn sire lines and nine Australorp dam lines, involving approximately 900 White Leghorn x Australorp pullets.

Genetic Control of Egg Quality.—Investigations have commenced. Initially the aim has been to evaluate techniques. Specific gravity is highly correlated with shell thickness. An original method has been evolved to measure the breaking strength of egg shells. It is highly correlated with specific gravity. Data are being collected in respect of heritability of the characters.

Eggs from crossbreds have stronger and thicker shells and are larger than eggs from the parent breeds, White Leghorn and Australorp. They have, however, a lower albumen index at time of laying. It appears that shell thickness does not affect the rate of decline of egg albumen.

Apiculture Section

The year was very difficult for many beekeepers. In most localities, production of honey was normal until late spring, but summer and autumn crops, particularly inland, were most disappointing. Drought was the reason. It affected nectar secretion, but also the growth of ground flora which usually supplies much of the pollen so essential for the feeding of brood.

Honey Marketing.—The price of honey to the producer fluctuated considerably. Excellent spring seasonal prospects, and the lessening of demand overseas weakened the price. Then, due to drought, inland production of choice quality honey was restricted and much of the South Coast honey was low grade. These factors revived the price, and the demand for choice honey.

Export trade continued, but much of the exported honey returned only 8d. to 8½d. per lb. to the producer, whilst many local sales have been at 1s. 4d. per lb.

Staff Position.—There are now three permanent livestock officers (apiculture) stationed in country regions. From their regional headquarters they provide extension and inspection services to beekeepers. Mr. R. J. Roberts was appointed to the Western Region, with headquarters at Orange. Mr. R. B. Gulliford is located in Southern Region, at Wagga. Mr. F. S. Benecke is in Northern Region, at Tamworth. The Department has not previously had three permanent apiary officers located in country districts.

Departmental Apiaries.—Plans have been prepared for a new honey house at Wagga Agricultural College and machinery has been purchased for installation. Queen bees were purchased to improve the College breeding stock.

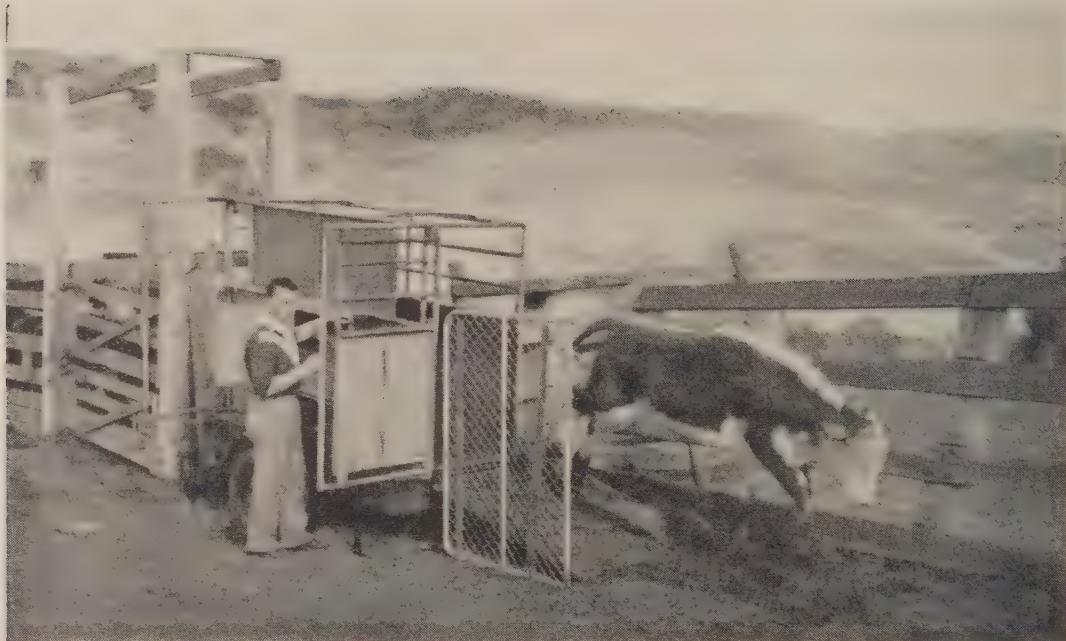
The breeding programme at Hawkesbury Agricultural College is progressing favourably.

New hive material has been purchased to improve the standard at Bathurst Experiment Farm. Trials concerned with pollination, and others with the effects of newer insecticides, are to be conducted now that a permanent apicultural officer has been appointed in the Western Region.

Hive material has been purchased to establish an apiary at Tamworth Experiment Station. Work at Tamworth will be mainly concerned with sac brood, Nosema disease, and problems in working white box (*Eucalyptus albens*) honey flows.

Extension.—Apicultural officers attended the various meetings of beekeepers, also Agricultural Bureau and Junior Farmer meetings.

A wide range of black and white and kodachrome slides is being built up by the section for extension purposes; and a print of the 16 mm. cine colour film "Bees for Hire" has been obtained on long-term loan from Caltex Oil Pty. Limited for extension use.



Mobile Cattle Weighing Unit

Such units have been acquired for research and extension projects concerned with the importance of birth weight and rapidity of early growth when selecting females for beef breeding purposes.

(Photo. from Leeton Experiment Farm.)

Summer School in Apiculture.—This was held at Hawkesbury Agricultural College during January, 1957. Suitable field conditions prevailed and it was one of the most successful yet held.

Apiculture Field Day, Tamworth.—This was arranged by the Department with the co-operation of beekeepers and held on 27th September, 1957. It was the first held in the northern districts for many years, and a great success.

Apicultural Field Day, Molong.—This was arranged by the Central Western Beekeepers' Association and the Department and held on 15th March, 1958. It was an outstanding success, attended by approximately 400 people.

Extension Exhibits.—The section again was prominent in arranging and conducting demonstrations at the R.A.S. Show, Sydney, and in Honey Week. Apiarists' Associations appreciated these activities.

Bee Diseases.—No serious outbreak of sac brood was reported, although in the previous year it caused great economic loss. Nosema disease was widespread in the autumn and seriously affected south coast honey production. Officers controlled a number of outbreaks of American Foul Brood. The most serious was at Gundagai, where a large commercial apiary was infected. Control was made difficult because seasonal conditions did not favour inspection of hives, and drastic fire restrictions prohibited the immediate destruction of infected material. Outbreaks, one serious, also occurred in the northern districts. Beekeepers concerned reported the outbreaks and willingly co-operated.

Apiaries Act, 1916-44.—Departmental officers have carried out inspections of apiaries to ensure that beekeepers are complying with the requirements of the Apiaries Act.

Visit by Overseas Apicultural Professor.—Dr. J. E. Eckert, Professor of Apiculture at the University of California, Davis, spent a fortnight in N.S.W. He visited many important honey-producing centres. The Department and apiarists co-operated in the itineraries. Dr. Eckert, in his six months in Australia on a Fulbright Scholarship, was mainly engaged in a study of the Ligurian bees on Kangaroo Island, and of problems associated with crop pollination by honey bees.

Commonwealth Conference of Apiculturists and Apiarists.—This occurred at the Waite Institute, South Australia, where Dr. Eckert outlined his work and his observations on Australian beekeeping practices. Principal Livestock Officer (Apiculture) Mr. A. Clemson attended.

Royal Jelly for Beauty and Medicinal Purposes.—This season has seen a new development in the beekeeping industry—the production of Royal Jelly for sale. It is being purchased for

inclusion in beauty preparations and also for medicinal purposes. Although the value of Royal Jelly has not been scientifically proven in Australia, it is in increasing demand by manufacturing chemists.

Beef Cattle, Horses and Goats Section

Staff.—Three applicants for appointment to the Section were interviewed at the Public Service Board on 17th June, 1958.

The posting of a livestock officer (this Section) to the Western Agricultural Region has markedly expanded the Section's influence, particularly since this officer also attends to beef cattle matters in the adjoining Mid-Western Agricultural Region.

Extension Work.—Radio, country press and field days continued to be the most important tools for extension purposes.

Representations.—The Principal Livestock Officer (this Section) continued to represent the Department in the following breed Societies:—

- The Arab Horse Society of Australasia.
- The Aberdeen Angus Society of Australia.
- The Goat Breeders' Society of Australia.
- The Poll Shorthorn Society of Australasia.
- The Commonwealth Clydesdale Horse Society.

The Department has been admitted to membership of the Australian Poll Hereford Society.

BEEF CATTLE

Fat Stock and Carcase Competitions.—These were restricted by the bad seasonal conditions. At Wagga, Dubbo, Macks-ville and Casino they were abandoned. The Principal Livestock Officer judged the carcasses at Goulburn Show and the livestock officer, Western Agricultural Region, judged the carcasses at Gunnedah Show.

Beef Cattle Breeders' Competition.—The competition was held for the sixth successive year in co-operation with the Agricultural Bureau and the Rural Bank of N.S.W. In spite of difficult seasonal conditions 134 entries were received. The State championship, contested between the winners of nine districts, was won by an Aberdeen Angus entry from Rylstone representing the Macquarie district. Mention of the associated field days and their effect in extension service is made in the Division of Information Services report.

Hexoestrol Implants in Early Yearling Steers.—Investigations into the effects were made at Belabula Farms. Over a period of 70 days the group which received 60 mg. hexoestrol gained 0.89 lb./head/day more than did the control steers, all of which were pasture fed.

Herd Improvement Based on Growth Rates of Calves.—At Belabula farms a scheme for herd improvement based on growth rates of calves from birth to weaning has commenced.

Observations on birth weights, and subsequent growth rates of Aberdeen Angus calves born at the Trangie Aberdeen Angus Stud continued. They are valued in the selection and evaluation of animals in the Stud. Growth rates of calves from birth to weaning are also being used for selection and culling purposes in the Aberdeen Angus breeding unit at Duck Creek.

Under Project 108: "Beef Cattle—Improvement of Breeding Stock", a set of mobile cattle weighing scales has been provided by the Agricultural Extension Grant for use in the Western Agricultural Region.

Stud Beef Cattle.—Small exhibits of Aberdeen Angus cattle from Trangie and Poll Shorthorn cattle from Wagga Agricultural College were entered at the 1958 R.A.S. Show, Sydney. Token Aberdeen Angus exhibits were made from Trangie stud at the Parkes and Trangie Shows and of Poll Shorthorns from the College stud at the Wagga Show.

The Poll Shorthorn Stud at Wagga Agricultural College was augmented by the purchase of 14 Poll Shorthorn heifers and eight Shorthorn heifers.

Five heifers and a cow with a bull calf at foot were added to the Poll Hereford Stud at Hawkesbury Agricultural College.

The Aberdeen Angus Stud located for over 20 years at Grafton Experiment Farm was closed down, with the transfer of 31 females and one bull to Leeton Experiment Farm where in future the breed will be used for investigational purposes.

The Aberdeen Angus stud at Duck Creek sub-station of Wollongbar Experiment Farm has grown from 66 to 75 females and should soon reach the target of 100 breeding cows.

Commercial Beef Cattle.—Commercial beef cattle are bred for ration supplies to the Colleges and to provide young cattle for experimental purposes on departmental institutions. The main centres of production have been Duck Creek and Grafton Experiment Farm but now Tamworth Agricultural Experiment Station will also contribute.

HORSES

Numbers on the Department's Institutions.—They have dropped from 485 in 1949 to 241 at 31st May, 1958.

Arab Breeding.—Arab horse breeding is being carried on at the Wagga and Hawkesbury Agricultural Colleges. Progeny of the recently imported Arab stallion, Razaz, are most promising.

The Department's Arab stallions continue to be popular for the service of privately-owned mares.

	Hawkesbury College	Wagga College	Total
Mares received for service, 1957	38	66	104
Free return services from previous season	7	20	27
Mares not served	1	3	4
Service fees paid	£325 10s.	£483	£808 10s.

Arab Awards at Royal Show.—The Department's Arab horse exhibit at the 1958 R.A.S. Show, Sydney, achieved outstanding success. Two stallions, a colt, two mares and three fillies, drawn from both Colleges, between them won:—Supreme Champion Arab Exhibit; Champion Arab Stallion; Reserve Champion Arab stallion; Reserve Champion Arab mare; four first prizes; three second prizes.

Clydesdale Breeding.—This is confined to Hawkesbury Agricultural College.

GOATS

Stud Goats.—Fifty-seven stud goats were on hand at Condobolin Experiment Farm as at 31st May, 1958.

Dispersal of the Toggenburg Stud.—This dispersal to concentrate on the Saanens, has simplified operations. The entire Toggenburg herd, five bucks and twenty does of varying ages, were sold by private treaty for a total of £433 18s. Nine of these goats were bought by interstate breeders.

Saanen Stud.—The Condobolin Saanen stud was founded in 1942 with the purchase of 18 does, and augmented in 1957 by the addition of 7 imported does. Of the 61 females in the stud on 31st May, 1958, the original purchase was represented by:—31 does descended from Avenel Grace, 10 does descended from Sarona Frivolity, 8 does descended from Avenel Betty, 2 does descended from Sarona Fiji, and one doe descended from Sarona Faith.

Progeny of only two of the imported does remain in the stud, viz., 8 does descended from Priory Priestess (imp.) and one doe descended from Fergus Karen (imp.).

Milk Production Records.—The best individual performance was by six-year-old Saanen doe State Idol who, in December, 1957, broke the existing New South Wales record of 17.8 lb. milk produced in one day under Official Herd Recording by yielding 19.2 lb. This doe has maintained an extraordinary rate of production throughout her current lactation.

More important, however, is the average production per doe per day for the entire milking herd. After kidding had got under way in August, 1957, the average milk yield per doe per day in the succeeding months (with the number of does being milked shown in parenthesis) was as follows:—

1957	
September	9.98 lb. (20 does)
October	10.77 lb. (27 does)
November	10.31 lb. (30 does)
December	10.74 lb. (29 does)
1958	
January	10.22 lb. (29 does)
February	9.62 lb. (28 does)
March	9.16 lb. (28 does)
April	8.29 lb. (25 does)
May	7.71 lb. (23 does)

Note: 10.4 lb. to 1 gal.

Service to Privately-owned Does.—The distance of the Condobolin Stud from the main centres of goat-keeping deters owners from full use of the sires. Even so, during the autumn of 1958 twenty privately-owned does were sent to this Stud for service.

Goat Awards at Royal Show.—A team of thirteen Saanen does was exhibited at the 1958 R.A.S. Show, Sydney. In addition to Hiram Reveler (imp.) winning the award for the buck whose progeny secured the greatest number of points in single classes, the does won:—Champion Saanen doe; 8 first prizes; 6 second prizes; 10 third prizes; and took approximately half of the total prize money available to Saanen does at this Show.

New Saanen Importation.—The Stud acquired an outstanding addition early in 1958, by the arrival of Mostyn Marcel (imp.); purchased from Miss Mostyn Owen of England. The landed cost of this buck to the Department was £203 19s. 11d.

Demand for Condobolin Stock.—The demand for stock from the Condobolin Stud is far in excess of supply. The waiting list is formidable. Importance of the Stud is underlined by the increasing number of visitors, many of whom are interstate.

Aetiology of Bent Leg in Goats.—An investigation into the aetiology of a condition known as Bent Leg in goats at Condobolin has been completed. The findings are being prepared for publication. They show that Bent Leg in goats is related to the Ca/P ratio of the ration fed to young kids. A ration in which the ratio exceeded 1.8:1 favoured the occurrence of the condition. When the ratio was less than 1.4:1 no case of Bent Leg occurred.

Poultry Section

Production Trends.—Egg production declined about 5 per cent. by comparison with 1956-57. Autumn production has declined more, particularly from country sideline production centres. Wheat import loading costs and lower prices for eggs on local and overseas markets led to reduced hatchings during 1957. These, and the less favourable seasonal conditions have been the main factors in lower egg production.

N.S.W. Poultry Improvement Plan (Eggs).—The Plan is proceeding satisfactorily.

A further stage was implemented, by random sampling of breeders' stock for testing at the official station located at Hawkesbury Agricultural College. Interim reports have been given to participating breeders, for comparisons with other entries.

Most accredited breeders are following the Plan closely, despite early difficulties in implementing it.

Demonstration Projects—Agricultural Extension Grant.—Demonstrations in the Tamworth-Kootingal district are continuing. The demonstrations include laying cages, small unit intensive houses, and free-choice feeding. All methods are now being employed commercially in the area, indicating the effect of the demonstrations.

Egg-laying Competitions.—The competition continued, under three housing systems: three-tiered, indoor cages; "Californian" stepped-tier cages; and six-bird units, in intensive litter houses. The first-mentioned system gave best results, but not significantly so.

The Open Random Sample Test.—This, with nine entries, was concluded. A change in the rules, to end testing at 500 days, has doubled the facilities for the next Test. Industry interest in this Test is such that, despite eighteen pens being now available, a ballot was needed to limit the entry to eighteen.

Extension Services.—Three district livestock officers (poultry), stationed respectively at Cumberland (Parramatta), Wyong, and Wagga, have engaged in extension work, including farm visits, lectures, demonstrations, short-term schools, publications, etc., and supervision of breeding work under the Poultry Improvement Plan (Eggs). Tamworth district has been without a regular officer, but monthly visits to the Region have been made by the Cumberland officer.

The services of poultry officers in assisting producers is indicated to some extent by the following figures, pertaining to the officers stationed outside Regions. There is no reference to publications, press articles or radio contributions in the list, but these have been considerable:—

Visits to private farms	1,133
Number of stock culled	45,000
Number of breeding stock selected	4,000
Visits to Govt. Institutions	20
Field Days	10
Judging at Shows	4
Lectures given	12
Visits to departmental farms	30
Chick sexing examinations held	1
Poultry Schools at Hawkesbury and Wagga Agricultural Colleges	3

Publications.—Booklets (5) comprising 145 pages of printed matter, on Culling Poultry, Duck Raising, Brooding and Rearing Chickens, Incubation, and Scientific Poultry Feeding, were revised for new editions.

Articles on topical subjects were prepared regularly for monthly issues of *Poultry Notes* in the *Agricultural Gazette of N.S.W.*

Poultry Schools.—The Sixth Annual Turkey School and Convention was held at Wagga Agricultural College and Experiment Station. Over forty students were in attendance. All States except Western Australia were represented.

Despite a recession in the industry, the Winter School for Poultry Farmers, held at Hawkesbury Agricultural College, was attended by forty-two farmers from various parts of the State.

A Poultry School for Junior Farmers was also conducted at Hawkesbury Agricultural College.

Piggery Section

Industry Trend.—The pig industry was seriously depressed throughout the year. Pig prices fell to a low level and feed costs rose to a record high level. Drought forced many pig-raisers to reduce drastically the size of their herds, and led to heavy marketing of unfinished pigs. Shortage of pigs is likely during the coming year; and experience has shown that increased interest in pig-raising will follow, accompanied by increased calls for advice from extension officers.

Staff.—Two appointments as livestock officer were made and one officer resigned. There is at present one vacancy in the approved establishment of the Pig Section.

Departmental Pig Studs.—The pig herds at Hawkesbury and Wagga Agricultural Colleges, and at Wollongbar and Grafton Experiment Farms were used for instructional and research work. Investigation into problems of nutrition comprised the main line of research.

Stud pigs were supplied to farmers. The following figures for Departmental herds indicate how the depressed market lowered the demand for stud pigs and caused values to fall:—

	1956-57	1957-58
Stud pigs sold	217	156
Market pigs sold	397	380
Pigs killed for food	285	320
Approximate value	£13,000	£11,000

Show Teams.—Teams of pigs from Wagga College and Grafton Experiment Farm were exhibited at local Shows with marked success. Livestock officers (pig) also acted as judges and stewards at the Royal Show, Sydney, and many country shows.

Swine Branding Act, 1940, and Swine Compensation Act, 1928-35.—Operation of the Swine Branding Act, 1940, continued to yield identification of the farms from which diseased pigs came. As reported earlier, because of a substantial reduction in claims for compensation the credit balance in the Swine Compensation Fund rose to approximately £92,000 and the rate of Swine Tax was therefore reduced from 2s. to 1s. per pig.

Extension and Regulatory Services.—The following table gives an indication of activities of livestock officers (pig) in extension and regulatory duties:—

	1955-56	1956-57	1957-58
Farms visited	1,135	1,144	975
Meetings attended	48	51	60
Pig sales attended	75	110	81
Field Days attended	35	45	47
Bacon factories visited ..	66	45	29
Experiment Farms visited ..	86	59	68
Shows attended	29	32	27
Lectures and demonstra- tions given	39	92	81
Stock Foods Act Inspec- tions	2	—	17
Broadcasts	43	44	59
Inspections under Swine Branding Act, 1940 ..	—	77	26

Many inquiries for advice on all aspects of pig-raising were dealt with in person, by correspondence and by telephone.

Annual School for Pig Raisers.—This was conducted at Hawkesbury Agricultural College and was attended by farmers from districts throughout the State.

Publications.—Apart from numerous press releases, three articles were prepared for publication in the *Agricultural Gazette of N.S.W.* and one for the *Land Annual*.

Assistance to other Departments and Organisations.—Visits were paid to institutions under the control of the Departments of Prisons, Health, Education and Child Welfare, to assist them in the management of pig herds.

Technical advice was also furnished to various farmers' organisations, the Junior Farmers' Club movement, the Australian Pig Society, Agricultural Show Societies, and the Agricultural Bureau.

Sheep and Wool Section

Staff.—No alterations to the establishment of the Section occurred. There are 26 livestock officers (sheep and wool) in the establishment.

The thirteen districts have remained fully staffed throughout the year.

A new livestock officer district, to comprise the Southern Tablelands and South Coast Region, with Cooma as headquarters, was approved by the Public Service Board; but with no increase in strength of the Section. This position will be filled as soon as an officer sufficiently experienced is available, probably early in 1959.

Persistent requests have been received from the Western Division of the state for the appointment of an extension officer, and approval for an appointment there has again been sought from the Public Service Board.

Extension work carried out by officers located in districts has been effective. Their services are in constant demand.

Requests for information on sheep raising on the north coast are increasing. Staff resources are insufficient for extensive work in the area. However, three visits have been made



Eight acres of *Phalaris* pasture of this Glen Innes property has carried 200 stud hoggets for 3 months, August-October, in the past 6 years

The performances of lucerne and *Phalaris* in many areas in 1957 re-focused farmers' attention on their drought resisting qualities.

(Photo. from Tamworth Office.)

to inspect and advise on established flocks, and to address various interested organisations. Suggested establishment of a small, pilot flock for observation at Grafton Experiment Farm is under consideration.

Seasonal Conditions.—The drought of 1957 made 1957-58 one of the worst sheep industry seasons for many years. Hand-feeding was general. Cereal crops were a failure; and fodder reserves were so low that only essential stock were fed, a bare maintenance ration. Wheat was in such short supply that import was necessary.

Prospects for the winter of 1958 vary considerably. Because of the poor summer growth the tableland areas have insufficient natural feed, and handfeeding in the early winter is anticipated. The north-west slopes and central-western plains, given a reasonable winter, should have a good spring. The south-west slopes and eastern Riverina require further rain. Pasture growth is only immediately sufficient; no excess growth is occurring.

Highlights from the Drought.—The following points were highlighted by the drought, as seen by sheep and wool officers:—

- (i) Most properties had insufficient conserved fodder for extensive drought feed;
- (ii) The continued good condition of sheep throughout the drought was remarkable; and attributed to the clover seed available on the ground as feed, due to improved pastures and to the absence of rabbits;
- (iii) The remarkable resistance of lucerne to the dry conditions and its response to small falls of rain;
- (iv) The success of early weaning of lambs, at 10-12 weeks of age; introduced and advocated by the Department as a means of better utilisation of small areas of pasture;
- (v) The increase in small irrigation plants; in December, 1957, irrigation material was temporarily in short supply, on a six weeks' waiting list; many of the plants failed in their purpose, due to inadequate water supplies.

Spring Lambing.—The spring lambing (September-November) was below average. Insufficient milk supply, from lack of good feed for the ewes, caused a high mortality rate in lambs. The lack of mothering instinct, and starvation of the lambs, not only caused mortalities. It resulted in many poorly grown surviving lambs.

Mating for autumn lambing.—This mating (October-December) because of the unfavourable pastoral conditions, was either delayed or not carried out. The greatly reduced number of ewes mated and the unfavourable conditions where mating was carried out resulted in a low autumn lambing. Neo-natal mortalities in lambs were considerable.

Re-assessments of Carrying Capacity.—With the shortage of feed, re-assessments of the number of stock carried became necessary. Large numbers of sheep determined surplus were marketed. In the main they comprised aged ewes and sheep of inferior quality. The store sheep market became virtually non-existent and these sheep had to be disposed of for slaughter. This, with falls in wool values and skin values, resulted in a rapid drop in lamb prices.

Production Trends and Forecasts.—Seasonal conditions have been such that any tendency to change from one type of production to another was not practicable. When pastoral conditions improve a swing towards lamb production is expected. This will be limited by the difficulty of obtaining suitable sheep.

Stocking figures will be down; due to the sale of surplus stock, the low lambing percentage in spring and autumn drops, and the fact that on a number of properties spring mating was not carried out. This will tend to stabilise the position, as re-stocking will be the major factor. Improvement in the seasonal pattern could result in fewer sheep and lambs reaching market.

The trend in wool values has been down, and returns were the lowest for ten years. This reacted on the livestock market, which together with the bad season reduced the store stock market to a point where, as aforementioned, virtually no trading was taking place. Fat sheep and lambs sold at substantially reduced prices; 30 per cent. to 40 per cent. lower than in the previous year.

The Economy Favours the Crossbred Lamb Breeding Flock.—Although the returns for lambs, like the wool market, are down, the overall financial return per ewe is now in favour of the crossbred lamb breeding flock. No rapid change over to this form of production will take place, because of the factors mentioned in earlier paragraphs (see "Production Trends").

Early Weaning (10-12 weeks).—The practice was introduced by the Section during the past season. The response to this management innovation has been good; sufficient to show that it will be firmly established as routine practice.

Publications.—Apart from press releases, two articles were prepared, "The Australian Merino" and "Sheep Management and Pasture Use" for publication in the *Agricultural Gazette of N.S.W.*

PROJECTS AT FARMS, STATIONS AND COLLEGES

Leeton Experiment Farm.—Sheep depastured on this Farm now total 2,400, due to the progressive policy of the Manager and fuller utilisation of the feed produced. The following trials are in progress at Leeton Farm:—

- (i) Early Lamb Production: A comparison of the performance of Border Leicester Merino cross and Dorset Horn Merino cross ewes when mated to Dorset Horn rams.
- (ii) Economic Trial: Breeding from ewe lambs in comparison with the standard practice. The evaluation of results to be on the return per ewe over the economic lifetime.
- (iii) Double Lambing Trial: A pilot trial to obtain information on breeding performance.
- (iv) Spring Lamb Production: This project has to date demonstrated that the production of spring drop lambs in the irrigation environment is capable of a worthwhile contribution to production through better use of the spring flush of pasture.
- (v) Cheviot Crossbred Ewe Trial: A trial to obtain information on the performance of the Cheviot crossbred, comparing Cheviot cross Romney Marsh and Border Leicester cross Merino ewes.

Yanco Experiment Farm.—

- (i) Commercial Trial, for early lamb production: A comparison of Romney, Merino, Border Leicester Merino and Corriedale ewes for early lamb production. Incorporated in this trial is a comparison of the results from a controlled nutritional plane with those from an *ad lib.* nutrition.
- (ii) Spring Lamb Production: Trial to obtain information on the merits of Southdown and Dorset Horn rams mated to Dorset Horn cross Merino and Border Leicester cross Merino ewes. Also in this trial is the comparison of the mating of maiden ewes to a small breed of ram (Southdown) with a larger breed (Dorset Horn).

A further trial, in which the ewes and lambs are grazed on different types of pasture, has yielded valuable information. Lambs were successfully marketed from dry Subterranean clover and Wimmera rye grazing.

Condobolin Experiment Farm.—

- (i) Fixation of the Border Leicester: Progress is satisfactory. A note on it occurs earlier in this report of the Division of Animal Industry.
- (ii) Supplementary and Drought Feeding Trial: The areas required for this project have now been prepared. The work will be controlled by Glenfield Veterinary Research Station. It will commence early in 1959.

New England Experiment Farm.—

Lamb Raising Trial: To compare the performance of Border Leicester cross Merino and Dorset Horn cross Merino ewes mated to Dorset Horn rams.

Temora Experiment Farm.—

- (i) Poll Dorset Flock: This project is now well established and has been recognised by Dorset breeders as one of the leading studs of its kind. Last year seven rams to the value of £1,100 were sold. A long waiting list for the purchase of Polled rams contains the names of most of the leading breeders of Dorsets in New South Wales.
- (ii) Corriedale-Polwarth Trial: A trial to compare the commercial value of these two breeds. They are used extensively in the south-western and Riverina districts.

Trangie Agricultural Experiment Station.—All of the sheep on this Station are used in Merino research work, including the inheritance of wool characters. An earlier section of this report of the Division of Animal Industry covers the work.

Shannon Vale Nutrition Station.—

- (i) Investigations into the nutrition of Merino sheep for wool production and breeding performance in the New England environment.
- (ii) Studies of the effect of improved nutrition on the growth and reproduction of Merino sheep.

- (iii) Investigation into the effect of varying nutritional planes on the breeding performance of Romney Marsh and Merino ewes.
- (iv) Cheviot cross, Romney Marsh cross and pure Romney Marsh ewes are being compared.
- (v) Cheviot cross Merino sheep have been bred, the ewe portion being retained for future use in lamb production. At the weaner stage, the Cheviot Merinos were disappointing. They showed much of the Merino conformation, on considerable wrinkling. Further evidence is required before sound assessment may be made.

Cowra Experiment Farm.—

- (i) Lamb Raising Trial: Comparing the Border Leicester cross Merino, Romney Marsh cross Merino and Corriedale ewes mated to Southdown and Dorset Horn rams, to observe any advantage to be gained through the mating of maiden ewes to a small breed of ram (Southdown). Progress is satisfactory.
- (ii) Spring vs. Autumn vs. Dual Lambing: To obtain information on the economic returns from the various times of lambing in the Cowra environment.
- (iii) Early Weaning Experiment: Lambs weaned at 8, 10 and 12 weeks of age. The success of this work, with other information, has enabled a firm recommendation to be made for the weaning of lambs at 10-12 weeks of age. Earlier mention of the effect on primary producers is made in this report of the Sheep and Wool Section.

Extension Work.—Requests for information on drought feeding and the management of flocks under such conditions formed the bulk of inquiries.

Greater use of radio was made, facilitated by the location of tape recorders at country centres.

The work of district livestock officers (sheep and wool) of whom there are thirteen is summarised as follows:—

	1956-57	1957-58
Number of properties visited ..	2,126	2,101
Sheep classed	275,798	267,747
Rams and ewes selected for breeders	4,736	3,371
Value of rams and ewes selected for breeders	£60,668	£53,186
Sheep selected for War Service Land Settlers	7,121	8,098
Value of sheep selected for War Service Land Settlers	£33,099	£30,765
Visits to War Service Land Settlers	181	197
Lectures, demonstrations, field days	206	194
Agricultural shows, ram sales, etc.	83	93
Radio broadcasts	155	197

DIVISION OF SCIENCE SERVICES

Biological Branch

PLANT PATHOLOGY SECTION

NEW PLANT DISEASE RECORDS

Sixty-seven new plant diseases were recorded.

Favoured by very hot and dry spring-summer conditions powdery mildews were severe. They were recorded on several new hosts.

In contrast to 1956-57 only four new records of root rots caused by species of *Phytophthora* were made.

Several new diseases of economic crop plants were recorded including wallaby ear (virus) of maize, causing severe damage on the north coast; root rot of golden tares on the central and north coast; black ring disease (turnip mosaic virus) of several cruciferous vegetables from the Sydney metropolitan area; and powdery mildew damaging the leaves and russetting the pods of beans at Moree.

Other interesting diseases recorded were root knot (*Meloidogyne hapla*) of carrot recorded from the Murrumbidgee Irrigation Areas; black spot and stem rot (*Ascochyta caricæ*) of papaw from Coff's Harbour, and woody gall virus of citrus from several areas on the central coast.

CEREAL DISEASES

Wheat Diseases.—The wheat harvest was the smallest since 1919 and the dry conditions were unfavourable for the development of most diseases. Disease records were few. Hail damage occurred as usual, causing an estimated 1.47 per cent. loss.

The rusts (*Puccinia graminis tritici*) were of little importance. Foot rot (*Helminthosporium sativum* and other fungi) and take-all (*Ophiobolus graminis*) were much less important than in the previous year, the only noticeable damage being in the south-west.

Bunt (*Tilletia foetida* and *T. caries*) continued to be rare, being detected in only one delivery to the Australian Wheat Board and not observed in the field at all; but loose smut (*Ustilago tritici*) again appeared more prevalent. The incidence of this disease is not affected by environmental conditions once infected grain is planted.

Other diseases were relatively unimportant. Eyespot (*Cercospora herpotrichoides*), observed for the first time in New South Wales in 1956-57, was not recorded.

Maize Diseases.—The past season has been remarkable for the widespread occurrence on the north coast of a virus disease known as "wallaby ear". This disease has not previously been recorded in New South Wales but has been present in southern Queensland for many years. Probably it has been present in trace amounts in New South Wales in the past.

"Wallaby ear" was observed as far south as Bellingen, seriously reducing the yield of many late-sown crops. It caused complete loss in some cases. The symptoms developed most strongly in crops infected while very young and which subsequently experienced very dry conditions. With the haying-off of grasses by drought conditions, the leafhopper vector was probably driven in large numbers on to the young maize. It is hoped that the disease will not become important; otherwise it may be necessary to attempt to produce hybrids carrying resistance.

Stem rot (*Fusarium* spp.) was common on the north coast following the unusually wet April, 1958, and was severe in a breeding plot at the New England Experiment Farm. The lines at this Farm will be tested for resistance to *Fusarium* and *Diplodia* in the coming season.

DISEASES OF PASTURE PLANTS

Diseases of Grasses.—Except for occasional damage to rye grasses by leaf rust (*Puccinia coronata*), pasture grasses are little troubled by diseases in this State. This year, however, considerable areas of Kikuyu (*Pennisetum clandestinum*) have died out in the Clarence, Richmond and Tweed areas. Examination of many specimens, and visits to the areas, have not revealed the cause. There is no evidence that fungi or bacteria are responsible. The affected plants were lightly infested with tarsonemid mites between the leaf bases. With the co-operation of Entomological Branch, the problem will be investigated from that angle in the coming season.

Clover Diseases.—Diseases new to N.S.W. continue to be identified on these plants.

Sooty blotch (*Polythrincium trifolii*) of crimson clover (*Trifolium incarnatum*), and leaf spot (*Cercospora* sp.) and rugose leaf curl (virus) of white clover (*T. repens*) were recorded.

Scorch (*Kabatiella caulivora*) was again recorded on berseem clover (*T. alexandrinum*), but not on subterranean clover (*T. subterraneum*) on which it was damaging in the spring of 1955, the year in which it was first recorded here.

Anthraxnose (*Colletotrichum trifolii*) was recorded on red clover for the first time for several years, during the hot humid weather in late summer; and rust (*Uromyces trifolii subterranei*) was damaging to subterranean clover in the autumn.

A collection of clover species and varieties has been made and it is planned to test them for resistance to anthraxnose and possibly other diseases.

Lucerne Diseases.—Anthraxnose (*Colletotrichum trifolii*) was recorded for the first time since 1915. Fortunately, this destructive disease occurs only rarely.

The protracted autumn favoured the development of downy mildew (*Peronospora trifoliorum*) and rust (*Uromyces striatus*). Many seedling stands were badly affected and the plants were unfortunately too young to be grazed or mown to reduce the inoculum and encourage regrowth.

Witches' broom (virus) was conspicuous during the summer, west of the mountains. Both forms of the disease were present, i.e., that producing typical symptoms and that causing virecence of the inflorescences. This disease continues to limit the useful life of stands, and it is believed that severity of the symptoms and death of infected plants is associated with frequent cutting or grazing and dry conditions.

A damping-off caused by *Pythium debaryanum* has hampered the establishment of lucerne in southern districts. A project has been commenced in co-operation with the Agricultural Research Institute, Wagga, to study the effect of fungicidal dusts on the damping-off and nodulation of lucerne.

Cowpea Diseases.—The *Phytophthora* root-rot which has been so destructive in previous seasons was not recorded this year. Work in Queensland indicates that resistant varieties will overcome this disease.

Diseases of Golden Tares.—The fungus causing a severe root rot of tares at Raleigh in 1957 has been identified as *Cylindrocladium* sp. It is not widespread.

In other districts a variety of diseases are preventing tares from fulfilling expectations. Several diseases are being investigated. A collection of *Vicia* species and varieties has been obtained from the C.S.I.R.O. in a search for sources of resistance.

DISEASES OF VEGETABLES

Powdery Dry Rot (*Fusarium trichothecoides*) of *Potato*.—This disease caused serious economic losses in consignments of certified seed potatoes produced at Crookwell in the late autumn and the winter of 1957. Losses were reported from most areas to which Crookwell seed had been consigned. Some 1,100 bags of Sebago and Sequoia tubers received at Windsor and Richmond developed an average of 22 per cent. powdery dry rot, with infection varying from 2 per cent. to 80 per cent. in individual lots. Estimates of losses in Crookwell potato seed in other parts of the State average 20-25 per cent. infection.

The pathogen is a soil inhabitant and a wound invader of the tubers. The following factors are thought to have produced the unprecedented incidence:—(a) an unusually warm autumn at Crookwell, with an absence of the killing frosts usual in April and May; thus the earlier-dug tubers in particular had soft skins and prone to injury; (b) injury was through faulty manipulation of mechanical diggers, and during subsequent handling and grading operations; the percentage of powdery dry rot in fork-dug was much less than in mechanically dug potatoes; (c) at digging time, temperatures in the 40°-50°F. range at Crookwell retarded sufficient healing of cut or injured tuber tissue.

Lack of proper storage facilities to expedite tuberisation, and the consequent consignment of tubers soon after digging, did not permit the detection of infected tubers at Crookwell. The disease then developed rapidly under warmer coastal conditions.

A trial at Hawkesbury Agricultural College in the spring of 1957 clearly showed that losses could be expected under coastal spring conditions if seed tubers infected with powdery dry rot were planted. Healthy seed gave an emergence of 92 per cent. and a yield of 7.44 tons per acre. Seed which was lightly affected gave an emergence of 72 per cent., and 27.8 per cent. of the plants became affected with blackleg disease (*Erwinia carotovora*). This arose as a soil infection through the dry rot affected seed pieces. The yield obtained was 4.29 tons per acre. Seed which was moderately to heavily affected with powdery dry rot gave an emergence of 39.2 per cent., and 34.6 per cent. of the plants became affected with blackleg. The yield obtained was 1.59 tons per acre.

Rugose Mosaic (*Potato virus X* + *Potato virus Y*).—For the first time in many years this disease led to rejection of potato crops from certification. Two crops, one of the variety Walanga and one of Late Ashworth were rejected. Each crop contained about 20 per cent. of the disease. Infections of the order of 1 per cent. were detected in other crops of Walanga submitted for certification, and 15-20 per cent. infection was present in a Walanga crop not submitted for certification.

In view of the high susceptibility of the Walanga variety to rugose mosaic and also its tolerance of the disease, it is a hazard to the Potato Seed Certification Scheme. Henceforth this variety will not be accepted for certification in N.S.W.

Leaf Roll (*Potato Leaf Roll virus*).—For the third successive year, no crop submitted for certification was rejected for excess leaf roll. Virtual disappearance of the susceptible

Factor variety, and this Department's introduction of new varieties with high freedom from leaf roll, have eliminated the disease from N.S.W. certified potato seed.

Late Blight of Potato (*Phytophthora infestans*).—As in the 1956-57 season, late blight was of no importance because of prevailing dry conditions. The results of the project in co-operation with Division of Plant Industry, for development of potato varieties immune to the "O" race of *P. infestans* showed that a number of seedlings derived from the U.S. varieties Cherokee and Pungo and the Scottish seedling 914 a(91) are immune to the "O" race.

Early Blight (*Alternaria solani*) of *Potato*.—This caused severe defoliation of Plymouth and Pungo and the seedlings 2079 ab(7) and 835a(4) x Adina in the Department's potato plots at Red Range. Moderate damage was caused to the seedling 1591 b(9), and light damage to seedlings 835a(4) x 11-79, S2540 x Cortland; Monak x 11-79; 1928e(2) and the variety Sebago.

Very heavy early blight was observed at Oberon on the Walanga variety. Previously Walanga was thought to be relatively resistant but in this instance was as susceptible as a nearby crop of Sebago.

Common Scab (*Streptomyces scabies*) of *Potato*.—In co-operation with Division of Plant Industry, the project for developing scab-resistant potatoes suitable for local culture is being continued. The varieties Cherokee and Ontario are being used as parents.

Fungus Wilt of Tomatoes.—Cultures of highly pathogenic strains of *Fusarium oxysporum* f. *lycopersici* and *Verticillium dahliae* were prepared as required by the Division of Plant Industry in a breeding programme for the production of varieties of tomato resistant to fusarium wilt and verticillium wilt.

Virus Diseases of Tomatoes.—No progress was made towards control of yellow top of tomatoes. It was observed only on occasional plants. The virus of drophead wilt was recovered from leaves which had been dried and powdered and stored for nine months at room temperature. This further confirms the opinion that this virus is a member of the tobacco mosaic complex.

Bacterial Canker (*Corynebacterium michiganense*) of *Potato*.—Bacterial canker of tomato was more common and widespread than usual. Departmental recommendations for seed treatment now include hydrochloric acid. This has been shown to have no adverse effect on the vitality of tomato seeds. Full co-operation of seed merchants and nurserymen has been obtained in measures for the control of canker. Bulk lots of acid-treated tomato seed will now be available to tomato growers.

Bean Seed Certification Scheme.—In co-operation with Division of Plant Industry, the Bean Seed Certification Scheme was continued for the fifteenth successive season. On the south coast, 129 crops were passed for certification. The majority was Brown Beauty. Of the twenty-six crops rejected for certification, ten were for the presence of anthracnose and one for halo blight.

For the first time since its release several years ago, a crop of the Vickery strain of Brown Beauty was seemingly found infected with anthracnose, at Bega. However, it proved to be a case of seed of a susceptible strain having become mixed with the resistant Vickery strain. The sources of this contamination are being investigated.

Bean Anthracnose (*Colletotrichum lindemuthianum*).—The testing of bean lines for resistance to anthracnose continued. Cross-bred lines from Emeritus Professor W. L. Waterhouse were tested with races Aust. 6 and Aust. 8. The majority was susceptible to one or other of the races, but a few lines resistant to both races were found. These are being carried on to the next generation. F1 seeds of an interspecific cross between the *Phaseolus vulgaris* variety Hawkesbury Wonder and the *P. coccineus* variety Scarlet Runner were sown, and a considerable quantity of F2 seed was harvested. This will be tested for resistance to anthracnose.

A large number of selections of wild *Phaseolus vulgaris* and other *Phaseolus* species collected in Central America were obtained from Dr. O. Norvell of the Carnegie Institute, Stanford, California. Some of these were immune and many highly resistant to several races of anthracnose in N.S.W. They may have also good resistance to rust and halo blight, and they appear to be promising breeding material. Some crossbred material, of wild lines with commercial varieties, has also been made available by Dr. Norvell; and this material is being tested.

Intravarietal variation in disease reaction of beans has been further investigated. Several varieties are heterogeneous for their reaction to a given race of anthracnose, and several types of variation have been found. Theoretical and practical problems associated with this variation are being investigated.

Bean Halo Blight (*Pseudomonas phaseolicola*).—Preliminary tests with seed treatments for control of seed-borne halo blight indicate that soaking in an aqueous solution of streptomycin sulphate for fifteen minutes gives some control. With solutions of 1:100 and 1:200 strength, no carry-over of disease was detected in glasshouse tests. With weaker solutions, a small amount of seed-borne infection occurred. Work is planned to see if these results hold in field tests, and to explore alternative methods of treating bean and other vegetable seeds to control seed-borne diseases.

Club Root (*Plasmodiophora brassicae*) of *Cauliflower*.—Testing of fungicidal slurries as a pre-transplant root treatment continued. A grower at Richmond obtained complete control with pre-transplant root treatment in 4 per cent. calomel-talc slurry, as suggested from previous trials by Biological Branch.

Black Ring of Crucifers (*Cabbage Black Ringspot Virus*).—This disease was recorded for the first time in N.S.W. on crucifers, in a commercial trial at Dundas. Practically 100 per cent. of the plants in three lines of broccoli were infected. Necrotic ringspot development was very severe on the leaves of the "Waltham No. 29" variety and had caused abscission of many of the outer leaves.

The Morse Medium variety developed moderate and Morse Early very light leaf symptoms. The disease did not appear to affect the vigour of these two broccoli varieties.

About 1 per cent. of plants of Shorts cauliflower and Enkhizen Glory cabbage were also infected. Only the outer leaves of these plants showed necrotic ringspot development. Vigour of the plants was not affected.

Origin of the infection is obscure. The broccoli plants had been heavily infested by the slaty grey aphid (*Brevicoryne brassicae*). This could have transmitted the virus from an undetermined host plant. The virus may have been present locally for some time. If its effects on cabbage and cauliflower at Dundas are the normal expression of symptoms on these hosts, the disease could have been overlooked in the past.

Fusarium Wilt (*F. oxysporum* f. *melonis*) of *Rockmelon*.—Until 1957 this disease had been recorded only once in N.S.W., at Brookvale in the Sydney metropolitan area. In the spring and early summer of 1957, two new outbreaks occurred, at Moorebank (Sydney metropolitan area), where moderate loss occurred in a $\frac{1}{2}$ -acre crop of rockmelons, and in the Griffith section of the M.I.A.

At Griffith, the disease was of major importance. The fungus caused "damping off" of seedlings. Losses of up to 60 per cent. were recorded, with 20-40 per cent. losses general. Most of the early plantings had to be resown three or four times. Losses became less as the season progressed. Cool soil temperatures early in the season favoured the disease.

The wilt-resistant variety Delicious 51 is not favoured by growers or buyers in the M.I.A. It is too large and has poor keeping quality. Seed of a new, wilt-resistant early maturing variety named Spartan Rock was recently obtained from Michigan, U.S.A., for trial at Griffith and possible use in breeding.

Squash Mosaic (*Squash Mosaic Virus*).—A disease of pumpkin, squash and marrow similar in many respects to that described overseas as due to Squash Mosaic Virus was observed for the first time at Milperra and Cornwallis. At Milperra, up to 100 per cent. infection was present in marrow and squash plantings in early March. At Cornwallis, 40-50 per cent. infection was present in pumpkin and marrow plantings.

Squash Mosaic is one of the virus diseases transmitted by mandibulate insects, and the recorded overseas vectors are not present in N.S.W. Thus the disease is of special interest. An effort to establish its identity is being made.

Black Root (*Aphanomyces raphani*) of *Radish*.—This caused losses up to 100 per cent. in radish plantings in Sydney market gardens.

The effects of vapam and pentachloronitrobenzene were tested in infested soil at Milperra. "Vapam 4S" applied to the soil at the rate of 100 gallons per acre two weeks prior to planting reduced infection from 98.4 per cent. to 38.4 per cent. Pentachloronitrobenzene applied to the soil two weeks prior to planting at the rate of 90 lb. active ingredient per acre only reduced infection to 78.5 per cent. The work is being continued.

Beet Nematode (*Heterodera schachtii*).—No further outbreak of this parasite has been recorded since last year, and the property at Milperra is the only one known to be infested in New South Wales. A survey of this property in the spring of 1957 revealed an increase in the soil population of viable cysts in some parts and a decrease in other parts, depending to some extent on the cropping practice. The property concerned has ceased to be a market garden, having been sold to industrial interests.

CITRUS DISEASES

Scaly Butt Virus.—It has been suggested by Californian investigators that the shellbark disease of lemons is caused by the scaly butt virus. In co-operation with Division of Horticulture this is being tested in several series of propagations:—(a) using buds from a number of scaly butt selections to inoculate nucellar lemons on rough lemon and trifoliata rootstocks; (b) using buds from a number of shell bark affected Seville oranges to inoculate virus-free trees of Valencia on trifoliata stock.

Susceptibility of Rangpur lime to scaly butt is also being explored. Buds from a number of scaly butt and shell bark selections have been used to inoculate Rangpur lime seedlings.

Experiments were commenced in 1952 to determine whether stunting of trees on trifoliata stock not affected by scaly butt was virus in nature, and to determine the relationship between stunting and scaly butt. Trees propagated from several selections of stunted parent trees were inoculation-budded with a severe form of scaly butt virus. This now appears to have exerted a depressing effect on growth of all selections as well as of control trees. No protective effect of stunting is apparent. No definite conclusion can as yet be drawn.

A study of anatomical effects associated with various types of stunting has been commenced.

Tristeza and Stem Pitting Viruses.—Observations are continuing on grapefruit selections carrying strains of stem pitting virus of varied severity, at Yanco Experiment Farm and Somersby Citrus Research Station. This is a project in co-operation with Division of Horticulture. So far the propagations are maintaining the symptom type of the parent tree. However, it is as yet too soon to conclude that field control of this disease by mild strain protection is possible.

Anatomical studies on stem pitting have shown failure of xylem elements to form at the normal rate, and failure of regular and even lignification at the site of the depression, resulting in crushing and deformation. The effect of tristeza virus is necrosis of phloem elements. These studies are continuing.

Lemon Crinkle.—No further record has occurred. Further propagations to indicator seedlings confirmed (a) that severe and mild strains of the virus exist; (b) that psorosis type reactions are not obtained. The virus is now regarded as distinct from psorosis.

Joppa Ring.—A disorder associated with some Joppa orange selections on rough lemon stock has been included in the citrus virus research programme. The main symptom is a ring of corky broken bark at the bud union. Inoculation buddings of Valencia, Paterson, Mediterranean sweet oranges and Nagami cumquat on rough lemon stock have been made, and ring-free Joppa selections have been propagated on rough lemon stock for future use.

Xyloporosis.—This is a serious virus disorder of sweet lime stocks in Israel and of some tangelo and mandarin varieties in the United States of America and South America. On symptoms, it has been identified tentatively as the cause of decline and death of a planting of young Ellendale mandarins on trifoliata stock at Griffith. Pathogenicity trials with indicator seedlings have been commenced.

Yellow Ring.—Nucellar Eureka lemons, which were making excellent progress in experimental blocks at Yanco and Narara, have started to show decline, yellowing and leaf fall, associated with an indented ring at the bud union and gumming in the bark at that point. The condition is also known in California, in Eureka lemons on Troyer citrange and trifoliata. It may be of virus origin or due to incompatibility.

The object of these nucellar selections was scaly butt free material of lemons which could be used on trifoliata stock. The development of the yellow ring condition indicates that trifoliata may not be used with lemons even though scaly butt is eliminated.

The same disorder has developed under glasshouse conditions with nucellar Seville orange on trifoliata.

Woody Gall.—A disease of rough lemon, woody galls on branches and main trunk, is under investigation. This has been transmitted by budding to rough lemon seedlings and is presumed to be of virus nature. Affected trees of seedling rough lemon have been located in a number of rather isolated areas; and the disease may have originated from a non-citrus source. Two orchards have been found in which rough lemon stocks are heavily galled, but sweet orange scions are unaffected.

Mandarin Brown Spot.—Very dry weather throughout spring and summer resulted in little or no disease development in spraying-trial plots which included copper oxychloride, copper oxide and dithiocarbamates.

Sudden Death.—Inoculation of killed sections of roots of a number of citrus stocks with the suspected pathogen have not yet been decisive. *Coprinus micaceus* was consistently associated with affected sections of the butts of trees on trifoliata stock at Koraleigh and Griffith.

About twenty-five grapefruit trees on sour orange stock at Griffith were found to be affected with "sudden death", the first record of this disease on a stock other than trifoliata. Here again *C. micaceus* was consistently associated.

Root Rot.—Studies on the pathogenicity of *Phytophthora citrophthora* and *P. parasitica* to a range of citrus species are being continued.

Winter Yellows.—This disorder has been very little in evidence in the past season. No experimental work has been possible. Fertiliser trials at Coomealla using different levels of nitrogen and phosphate have not yet yielded results.

Septoria Spot.—Pathogenicity tests of a *Mycosphaerella* suspected of being the perfect stage of *Septoria depressa* have not reproduced the disease. This may be because of loss of pathogenicity in culture.

DISEASES OF DECIDUOUS FRUITS

Black Spot (*Venturia inaequalis*) of *Apple*.—Primary infection this season was slight in all districts except Batlow. At Batlow, infection conditions were favourable, but excellent control was obtained through the recommended spray programme. Conditions from January, 1958, onwards favoured secondary infection in most districts.

For the tenth successive year the peak of maturity of perithecia was found to occur about mid-October. At Orange, where the winter was very dry, few perithecia appear to have reached maturity.

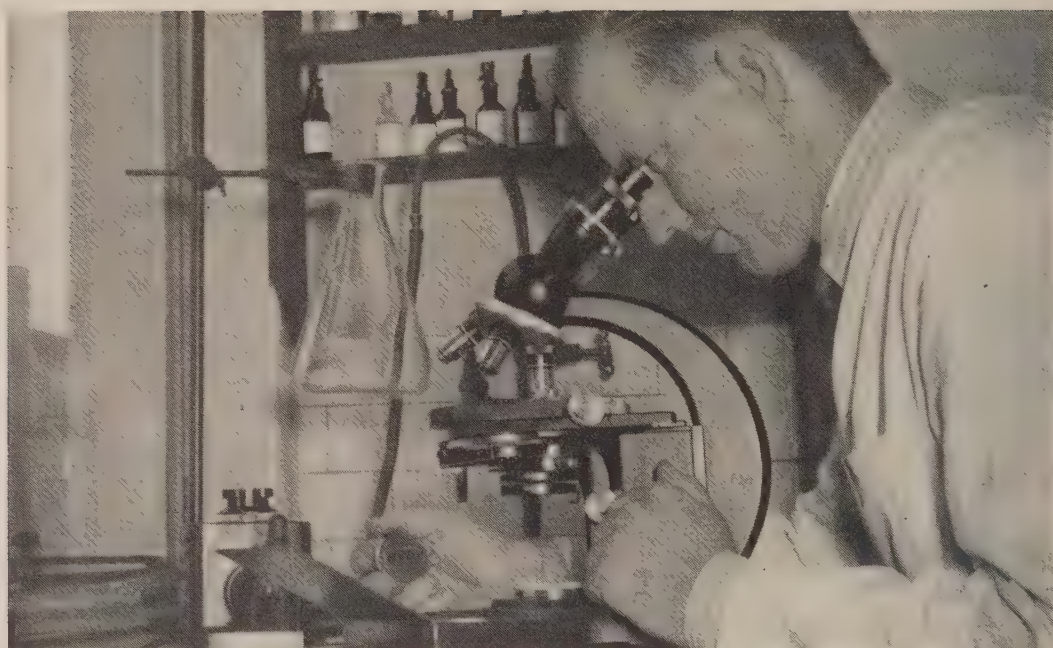
Black Spot Spore Traps, and Spray Warning Service.—In co-operation with Division of Horticulture two Hirst spore traps were operated, one in an apple and a pear orchard at Batlow and the other at Orange. At each of these centres a spray warning service was provided, based on the spore trap results and the "Mills System" of estimating infection periods.

Very few spores were trapped at Orange but the pattern of spore availability through the season at Batlow agreed with that of the 1956-57 season; and further confirmed the results obtained by laboratory methods, i.e., that spore discharge commenced in late September, rose to a maximum in mid-October, fell away rapidly until mid-November, then continued to decline, gradually, until it ceased in late January.

Diurnal Periodicity in Black Spot Spore Flights.—This was in marked evidence as in the 1956-57 season. Maximum numbers of spores were trapped about midday, mostly between the hours of 10 a.m. and 2 p.m. Again no spore was trapped at night.

Black Spot Spray Programme Experiments.—At Bathurst Experiment Farm an experiment comparing the "Mills System" of spraying with the standard recommended schedule on Granny Smith apples was conducted. Due to the drought very few sprays were applied and no infection occurred in either section.

At Orange, an experiment was conducted to compare the effectiveness of the following fungicides in black spot control on Delicious apples:—ziram, polyram, nirit; glyodin; phenyl mercuric chloride 0.005 per cent. (to the end of December—thence captan); P.M.C. 0.0025 per cent. plus captan 0.05 per cent. (i.e., each at half strength) until the end of December, thence captan 0.1 per cent., P.M.C. 0.005 per cent. following infection periods (i.e., the "Mills System"); and ziram with supplementary emergency sprays of P.M.C. 0.005 per cent. following district spray warnings (i.e., modified "Mills System"). No black spot lesion was detected in the experiment area. Consequently no comparison could be made.



Apple Black Spot Spore Counting

Biological Branch and Horticulture Division have maintained Black Spot (*Venturia inaequalis*) spore trap, spore counting, and spray warning services for apple and pear growers in particular districts.

At Batlow, an experiment was conducted to compare the effectiveness of various copper fungicides for black spot control on Granny Smith apples in the pre-bloom period.

At harvest time in this Batlow experiment no fruit lesion could be detected, but a few leaf lesions on late growth were found on five of six trees which received no pre-pink spray. A one-case sample of fruit was picked from each tree and held in common store for one month, but insufficient lesions developed to provide comparisons between the various treatments.

Also at Batlow, an experiment was conducted to compare the effectiveness in black spot control on Granny Smith apples, of four fungicides applied about the blossoming period. The fungicides lime sulphur, captan, thiram and ziram were applied at "pinking" stage (October 2), "full-bloom" (October 15) and "calyx" (October 30). All trees received uniform treatment before and after these dates.

The object was to compare the relative efficiency of the four fungicides at the low temperatures which prevail at Batlow during October, when ascospore inoculum is at a maximum. Three infection periods occurred between "pinking" and first cover, but each of the treatments provided complete protection.

At the New England Experiment Farm a long-term experiment to compare the effect of thiram with that of lime sulphur on the yielding ability of Granny Smith apples was continued. Results at the end of this the third season indicate a trend to higher yield under the thiram programme; due to an increase in fruit size and fruit numbers.

Apple Black Spot Eradicant Investigations.—Investigations into the use of post-harvest eradican treatments for black spot control were continued.

At Batlow heavily infected Granny Smith foliage was sprayed on May 9, 1957, with the following chemicals:—Phenyl mercuric chloride (P.M.C. 0.01 per cent.; P.M.C. 0.05 per cent.; P.M.C. 0.1 per cent.); copper sulphate 1 per cent.; lime sulphur 1-10; malachite green 1 oz. to 10 gal.; malachite green 1 oz. to 10 gal. plus white oil 1-40; white oil 1-40; and water.

Infected leaves from these trees were collected on May 13 and allowed to overwinter under natural conditions at Batlow. Samples of these leaves were tested in the laboratory at Sydney for spore discharge at intervals through the spring.

Only the mercury treatments suppressed the production of inoculum. No perithecia developed in leaves treated with 0.05 per cent. or 0.1 per cent. P.M.C., and the 0.01 per cent. P.M.C. spray reduced the inoculum by approximately 99.5 per cent.

Some relevant figures for number of spores discharged per square inch of leaf litter surface in the samples collected on October 28 were as follow:—water 2,893; P.M.C. (0.01 per cent.) 11; P.M.C. (0.05 per cent.) nil; P.M.C. (0.1 per cent.) nil; copper sulphate (1 per cent.) 3,426; lime sulphur (1-10) 2,165.

At Maroota, a well-isolated orchard of 220 apple trees had been sprayed in March, 1955, with 0.1 per cent. phenyl mercuric acetate, and in April, 1956, with 0.1 per cent. P.M.C. No fungicide was applied during the 1956-57 season or before the 1957-58 harvest. In each of those years no fruit infection occurred, and excellent crops were carried.

By the end of the 1958 harvest it appeared that the disease had been eradicated from this Maroota orchard. However, at the final inspection on May 28 trace infection was detected in late autumn growth on six Granny Smith trees distributed through the block. Inoculum may have been re-introduced to the block in second-hand cases (used contrary to agreement) during harvesting. Had there been any primary lesions present, extensive secondary development should have occurred during the prolonged rain periods in January, February and March, 1958, when 19 in. of rain (over 35 days) were recorded at Mr. Wilson's orchard. All Granny Smith trees in this block were sprayed thoroughly with 0.05 per cent. P.M.C. on May 31, 1958.

At Tumorrara (near Batlow) a small isolated orchard had been sprayed with 0.1 per cent. P.M.C. in autumn, 1957, this being the third successive autumn in which the eradican treatment was applied. Again, no fungicide was applied through the growing season. In the 60 bushels of fruit harvested, six lightly infected apples were found, and two infected leaves were detected on one Granny Smith tree.

A nearby orchard has been identically treated and no fruit or leaf lesion was detected in this 1957-58 season. The nearest apple trees not treated with the autumn eradican spray are approximately three miles away. These were heavily infected. Neither of the previously treated Tumorrara orchards was sprayed with the eradican in this 1958 autumn. No spraying will be done there for black spot control next season, although some wettable sulphur sprays will be required in one of the orchards, for powdery mildew control.

A great deal of interest has been shown by growers in the results at the above isolated plots. At Batlow this autumn many growers sprayed their orchards immediately after harvest with 0.01 per cent. P.M.C. This is expected to reduce inoculum by at least 95 per cent. Some of these growers will do no spraying in a section of their orchards next season, except to apply 0.005 per cent. P.M.C. following spray warning which will be issued by the district fruit officer.

Black Spot Eradication Demonstration, Yetholme.—All apple and pear trees in the 170 acre (forty properties) Yetholme locality received their second, post-harvest eradicator spray with 0.1 per cent. P.M.C. (applied at 3X concentration with a Turbo-mist sprayer) in autumn, 1957. The results were again very satisfactory and throughout the district a heavy crop of excellent quality fruit was harvested, virtually uninfected by black spot.

Trace infection was found on several orchards, but often was restricted to one or two apples in some thousands of cases of fruit. In one orchard in which only six infected trees were found in a total of 1,100 cases at the 1957 harvest, no infected fruit or leaf could be detected this season—a slightly heavier crop of perfect quality fruit. No spray was applied in this orchard through the spring.

In another orchard, where twenty lightly infected apples were found last season in 800 cases of fruit, the yield this season was 4,000 cases and only one infected apple was detected. The only leaf infection detected was in a small patch of young leaves on late growth on several adjacent orchards, on one young non-bearing Granny Smith tree. These leaves were picked off and the tree and those adjacent to it were sprayed with 0.1 per cent. P.M.C. The Granny Smith trees in the area from which the single infected apple is believed to have come were also sprayed. Several trees in this orchard were left unsprayed throughout the 1957-58 season and all remained entirely free of infection.

The only infection at Yetholme of any consequence occurred in a 1-acre planting, where the only spray applied for the 1957-58 season was lime sulphur 1-20 at the green tip stage. The spring was dry, but from mid-December, 1957, onwards there were numerous periods favouring infection. By February, 1958, moderate infection had been found in this block along one row of Granny Smith trees and an adjacent row of Beauty trees. By the end of the season these trees were heavily infected. All other trees in the block were free of infection except for a few lesions in the rows immediately adjoining each of the infected rows. These two rows may have been missed when the eradicator P.M.C. spray was applied in autumn, 1957. As it happens, these trees have demonstrated the infection potential of the season at Yetholme and emphasized the value of the autumn eradicator treatment in other orchards, especially on the trees which received no protective sprays throughout the season.

Only those sections of orchards where infection was detected were sprayed with 0.1 per cent. P.M.C. this autumn, 1958.

Black Spot (*Venturia pyrina*) of Pears.—Ascospore flights were again investigated, using a Hirst spore trap in an orchard at Batlow. Results fully confirmed those of the 1956-57 season, showing a marked diurnal periodicity in spore flights with maximum numbers trapped about midday, and a seasonal pattern of spore availability showing that spore discharge commenced in mid-September, rose to a maximum in mid-October and ended by the end of January.

Powdery Mildew (*Podosphaera leucotricha*) of Apple.—A powdery mildew infection of susceptible varieties was very severe. An experiment was conducted in a block of Jonathan apples at West Pennant Hills, to compare the relative effectiveness of Karathane, lime sulphur, wettable sulphur and a mixture of lime sulphur and wettable sulphur.

Each of these fungicides applied in a six-spray schedule provided very good control of mildew. At the concentrations used the sulphur treatments were slightly superior to Karathane. The latter, however, caused no fruit or foliage injury under heatwave conditions. This contrasted with the severe burning caused by the sulphur treatments, particularly those incorporating lime sulphur.

Virus Diseases of Pome Fruits.—Investigations on virus diseases and virus-like conditions in apple and pear trees were continued at the Gosford Citrus Research Station. These investigations involve virus transmission studies with apple "leafroll", and apple wood tumour condition, apple "green crinkle", pear "ringworm", a pear "fissure bark" and pear "rough bark".

Clear evidence of the graft transmissibility of the pear "rough bark" was obtained.

Two surviving Gravenstein trees on Jonathan stock which had been subjected to heat therapy for flat limb virus infection in 1956 grew well at Bathurst Experiment Farm and have not yet shown any evidence of developing flat limb symptoms.

Brown Rot (*Sclerotinia fructicola*) of Stone Fruit, Epidemiology Studies.—Investigations into the epidemiology were commenced in the M.I.A.

Using a Hirst spore trap, it was found that under the conditions of last season the spore population was very low until the fruit had reached maturity. Rain occurred just before and during harvest and the spore population rose to a high level. After the harvest the spore population fell to a relatively low level and stayed there for the remaining two weeks in which measurements were taken.

The work indicated a diurnal periodicity in spore flights, with maximum numbers trapped in mid-afternoon. This appeared to be correlated with the period of occurrence of the minimum, daily relative humidity.

Further trapping was carried out during June, 1958, and very small daily catches were made. The Leeton orchard in which these measurements were taken sustained a 5 per cent. loss from brown rot at harvest time.

In a preliminary test of conidial longevity it was found that after ten months in a dry state, but subject to atmospheric variations in humidity, some spores were still viable. After twelve months no germination occurred.

Eradicator Sprays versus Brown Rot.—At Yanco Experiment Farm a trial of dormant eradicator sprays was carried out on apricots using P.M.C., P.M.A., D.D.M. and malachite green. Treated and untreated laterals were bagged but no blossom infection developed in the controls.

At Leeton a dormant spray of P.M.C. 0.01 per cent. was applied through a semi-concentrate sprayer to a large portion of a block of apricots and a block of peaches. No brown rot developed in the untreated section in either instance.

Brown Rot Control Demonstrations.—Two long-term commercial demonstrations involving regular use of the control measures recommended by this Department were established, one at Griffith and one at Leeton. I.C.I.A.N.Z. Ltd. is co-operating by supplying the required fungicides. In each orchard the spraying is done with a semi-concentrate sprayer (Turbo-mist). At Leeton no brown rot occurred in the demonstration orchard this season and at Griffith only a trace of infection was detected. In each case a blossom spray and two pre-harvest sprays were applied.

Bacterial Canker (*Pseudomonas syringae*) of Cherries.—An experiment was commenced at Orange in which streptomycin nitrate 100 p.p.m. was applied to young cherry trees in a nursery at three periods (a) at the beginning of leaf fall in the autumn, (b) at mid-leaf fall, (c) at the completion of leaf fall, in addition to (a). These trees were planted in the 1957 winter. No bacterial canker has developed in the untreated trees.

Rust of Prunes (*Tranzschelia pruni-spinosae*).—At Young the best control again was obtained by means of a three-spray schedule of zineb plus white oil. The sprays were applied on 28th October, 6th December, and 23rd January. There was no difference between zineb used at 2 lb. per 100 gal. or at 1 lb. per 100 gal., each with $\frac{1}{2}$ gal. white oil per 100 gal. A little inferior to these treatments was a three-spray schedule of zineb 2 lb. per 100 gal., without the addition of white oil. Still less effective were a two-spray schedule, 21st November and 23rd January, of zineb plus white oil, and a three-spray schedule of Bordeaux mixture 2-3-100 plus white oil. These were followed in order of merit by a group of three ziram treatments in the three-spray schedule, viz.: a ziram slurry, Shell Chemicals product, and a ziram wettable power, Schering product; the latter with and without white oil. A three-spray schedule of nabam plus zinc sulphate, i.e. tank mix zineb, gave very poor control. The non-sprayed trees became heavily infected after the beginning of March, 1958.

Eradicator Spray versus Prune Rust.—An investigation of the possibility of prune rust control by applying the eradicator fungicide phenyl mercuric chloride to isolated infected trees during the autumn or winter was commenced.

Dormant trees with a history of severe rust infection were sprayed with 0.1 per cent. P.M.C. on 17th July, 1957, on three properties at Murrumbidgee near Young.

This season no spray was applied and no infection occurred on the two isolated trees on one of the properties, and the eight trees on a second property also remained free except for a few pustules on two low twigs on one tree. On the third property two trees became heavily infected, the inoculum coming from a number of heavily infected plum suckers nearby. These were not detected when the P.M.C. spray was applied. All trees except those on the first mentioned property were sprayed again with 0.1 per cent. P.M.C. on 6th May, 1958.

Shot Hole (*Clasterosporium carpophilum*) of Stone Fruits.—The possibility of controlling this disease by spraying trees in late autumn or winter with 0.1 per cent. phenyl mercuric chloride is being tested at Young. An isolated almond tree

was sprayed in April, 1957. Results this season were encouraging. The same almond tree and four apricot and two peach trees were treated this autumn, 1958, at Young. Meanwhile at Wiseman's Ferry thirteen well-isolated old apricot trees with a history of shot hole and freckle infection have also been sprayed with 0.1 per cent. P.M.C.

Root Rot (*Phytophthora spp.*).—The isolates *Phytophthora megasperma* and *P. cryptogea* obtained from rotted roots of flood-damaged peach trees in the M.I.A. during the spring of 1956 were submitted to a pathogenicity test on potted peach seedlings. These were waterlogged immediately after the inoculum was introduced to the soil. The effects were compared with non-inoculated but waterlogged controls.

The inoculations were carried out on 9th December, 1958, and were immediately followed by a period of extremely high temperatures. By 16th December all trees had wilted and become partially defoliated. Three trees from each series were removed to a cooler location outside the glasshouse and normal watering of them was resumed.

All non-inoculated trees recovered, but two of the three inoculated with *P. cryptogea* died, as did all three of the trees inoculated with *P. megasperma*. All trees allowed to remain in the glasshouse died. The results of this investigation were inconclusive because it was not possible to re-isolate either of the *Phytophthora* species from the roots of the dying trees.

Cherry Leaf Spot (*Coccomyces hiemalis*).—Again no evidence of this disease was detected. It now seems certain that the eradication measures applied in 1950 have been successful.

Bacterial Spot (*Xanthomonas pruni*) of Plums.—For the past three seasons severe bacterial spot infection has occurred on Wickson plums at Medowie and on Ruby Blood plums at Orange. In each case only the one variety has been infected in a mixed planting, indicating a well-defined variation in varietal susceptibility.

Zineb sprays applied in the orchard at Medowie have failed to control the disease. At Orange a dormant spray of 0.5 per cent. copper sulphate has been applied this winter, in an effort to restrict the development of cankers on the yearling laterals next spring.

Peach and Prune Replanting Problems.—At Leeton and Griffith with peaches, and at Young on a limited scale with prunes, pre-planting treatments of the soil are under test.

Vapam and nemagon were used at Young as pre-planting treatment where prunes were to be planted in land which previously had grown apples. Due to extreme drought conditions through the spring and early summer, tree growth was greatly restricted. Nevertheless the treated trees grew the more vigorously, particularly those treated with vapam.

At Leeton the experiment is comparing vapam at 100 lb., 200 lb., and 400 lb. per acre, and water, as pre-planting treatments where peaches are replacing peaches killed in the 1956 flood. At Griffith the experiment aims to compare vapam at 400 lb. per acre, nemagon at 9 gal. per acre, and water. Results from the Leeton and Griffith experiments are not yet available.

DISEASES OF TROPICAL FRUITS

Bunch Top (Virus) of Banana.—Very low incidence of the disease was again maintained. Factors influencing prolongation of the latent period of the virus in the banana plant are under review.

Leaf Spot (*Cercospora musae*) of Banana.—This was again widespread, but defoliation was less severe because of the dry summer. Following the advent of concentrate oil spraying of bananas in the West Indies a field trial was laid down at Lismore to evaluate the effectiveness of concentrate oil applied with fogging and misting machines. The results are incomplete but encouraging, and the method has created intense interest in the industry.

Speckle (cause undet.) of Banana.—It assumed major importance this year, causing widespread defoliation in the autumn and early winter. The causal significance of *Ramichloridium* sp., the association of Red Spider (*Tetranychus* sp.) and the practicability of controlling the disease with fungicides are being further investigated.

Root Rot (cause undet.) of Banana.—Extensive necrosis in the root system of banana plants is widespread on the north coast and causing unthriftiness in many plantations. High counts of the burrowing nematode (*Radopholus similis*) have been recovered from cortical lesions of roots and from soil surrounding unthrifty plants. The relationship of this nematode to root rot is being investigated in field, glasshouse and laboratory studies.

DISEASES OF GRAPEVINES

Downy Mildew (*Plasmopera viticola*).—Little or no downy mildew occurred in most grape growing districts. Spray trials which included a number of copper oxychlorides, copper oxide, dithiocarbamates, Bordeaux mixture, and Zinc Bordeaux, yielded no information.

Dead Arm.—Eradicant sprays of P.M.C. and sodium arsenite, and budswell sprays of captan and Bordeaux mixture were applied in experimental spray trials at Griffith and Orchard Hills. However, no infection occurred in the spring either in the M.I.A. or coastal vineyards. An unusual development of the disease took place in the M.I.A. in the variety Grenache following autumn rains. Cankers developed at the base of new canes and around leaf bases, causing premature reddening of foliage and die back of canes and branches.

Virus Decline.—From surveys, and transmission to indicators, it now seems clear that leaf roll virus is the main cause of declining production at Rooty Hill, at Corowa and in some Hunter River vineyards. The varieties Traminer and Chasselas appear to be almost totally infected. Infection has also been seen in Hunter River Riesling at Griffith and in coastal vineyards, and in a number of other wine varieties at Corowa and Griffith.

In addition, a virus causing vein clearing mosaic has been found in Chasselas at Rooty Hill and Corowa, in Tokay at Corowa, and in the stocks 3306 and ARG1 at Hanwood Viticultural Nursery.

Two other conditions, possibly of virus origin, at Corowa are (a) decline in vigour, associated with leaf scorching and leaf fall with petiole retention, and (b) premature reddening of foliage, also associated with decline of vigour.

Black Measles.—Identity of this disease has been confirmed by comparison with the disease in California.

A single vine sprayed with sodium arsenite in the Koraleigh settlement during winter 1957 showed almost complete recovery. Surveys indicate that this disease is widespread in many varieties in all vine-growing areas. In particular it is causing concern in new Soldiers' Settlement blocks at Coomealla. Investigations into control, cause, and means of spread, have commenced.

Yellow Vein Mosaic.—A virus closely resembling yellow vein mosaic is widespread in the variety Waltham Cross. It may be in part responsible for the notoriously poor cropping of this variety. Symptoms have been seen also in Grenache, at Corowa, and in sultanas at Goodnight and Coomealla.

Rachitism.—This was rather widespread, particularly in Black Muscat from Cessnock area, Orchard Hills, and Molong.

DISEASES OF ORNAMENTALS

General.—In the hot, dry spring and summer, disease incidence in ornamentals was negligible. In the autumn, warm and wet, fungal diseases were prevalent. The most important were root rots, responsible for decline in aloe, azalea, carnation, Christmas bush, chrysanthemum, geranium, kurrajong, leptospermum, pansy and sweet pea. Soil-borne fungal diseases were particularly severe also in nursery stock. They ranged from damping-off in seedling plots to root rots in advanced shrubs.

Phytophthora cinnamomi was isolated from the roots of dying nursery stocks of Christmas bush (*Ceratopetalum gummiferum*) and New Zealand tea tree (*Leptospermum lam-bethii*). Considerable losses, up to 80 per cent. of total stock, were experienced in each case.

Powdery mildews have also been prevalent in begonia, dahlia, gerbera, Portuguese laurel, ranunculus, rose and sweet pea.

Rose Wilt (Virus).—The incidence of wilt in nursery roses was again severe, particularly in varieties budded on to sprawling *Rosa multiflora* stock. This is believed to harbour the virus without showing disease symptoms. The following possible lines of control are being investigated: (a) use of a mother-stock bed kept virus-free by indexing periodically; (b) use of an alternative stock which will exhibit the symptoms when carrying the virus; (c) use of heat therapy to destroy the virus in infected stocks; (d) identification of the insect vector, and development of its control.

Carnation Crown Rot (*Sclerotium rolfsii*).—This was particularly severe in carnation plantings around the "Hills" district in autumn, 1958. It caused losses as great as 60 per cent. of a crop. Thiram soil drenches, as recommended, appeared to check the spread.

Carnation Root Rot (*Rhizoctonia* sp., *Phytophthora* sp., etc.).—Losses in cut flower growing nurseries rivalled those caused by crown rot. Control is under investigation.

Black Rot (*Xanthomonas incanae*) of *Stock*.—This seed-borne disease was severe in commercial plantings where hot-water treatment of the seed prior to sowing was not practised. Intensive roguing, spraying with Bordeaux mixture, and reduced overhead watering were helpful in control.

MUSHROOM CULTURE

The mushroom industry continued at a high level of production, although somewhat less than in 1956-57 when the peak New South Wales figure, about £500,000, was reached. The quality of commercial spawn remained high.

Nematode Infestations of Compost.—For the first time in this State, failures of some indoor and outdoor crops were associated with heavy nematode infestation of the compost. The occurrences were all in the Sydney metropolitan area during late autumn and early winter. Two genera of nematodes were found in the composts, viz.: *Ditylenchus* and *Rhabditis*.

Ditylenchus was found on four occasions. It was associated with production losses of from 50 per cent. to 70 per cent. Infested beds practically ceased production after the first flush. *Rhabditis* was found on two occasions, associated with losses of 100 per cent. in sections of individual beds. Each of these nematode genera has been recorded overseas causing losses in mushroom production.

BACTERIOLOGICAL SECTION

DAIRY PRODUCTS BACTERIOLOGY

Butter Quality Testing.—Bacteriological examination of dairy products continued, with a record number of analyses.

In co-operation with Division of Dairying, a comprehensive project of bacteriological testing of butter manufactured in N.S.W. was undertaken. Samples from thirty-seven factories, involving all of the major dairying districts, were tested weekly through the main producing months. They were tested for total, coliform, casein digester, yeasts and mould counts.

The sampling was organised so that a representative cross-section of the butter submitted for sale by each factory could be examined and a check kept on the production methods and hygiene of the respective factory.

Of the 501 samples analysed, 250, or 50 per cent., were deemed to be of unsatisfactory bacteriological quality on one or more of the abovementioned counts. This was an improvement on the preceding year, when 75 per cent. of the butters examined were classified as unsatisfactory; but obviously there is room for further improvement.

As in the 1956-57 survey, the most common defect was an excessive yeast and mould count. This accounted for some 80 per cent. of the unsatisfactory gradings.

The results of the examinations have been conveyed to the factories, with recommendations for overcoming particular forms of contamination.

Cheese Starter Cultures.—Adequate supplies of freshly lyophilised cheese starter cultures were maintained for distribution to cheese factories. Suggestions on manufacture techniques and starter cultures have been given throughout the year. A better appreciation of the need for sound techniques and careful handling of cultures has become apparent throughout the industry. It is evidenced by the frequent requests for replacement cultures. Instead of allowing the cultures to lag in activity and become contaminated through prolonged usage, most factories are adopting the practice of regularly replacing their stock cultures.

Lactic and fungal cultures for fancy cheese manufacture were also distributed. Manufacture of cottage cheese curd by persons with small plants has grown, as has the market for the product.

Bacteriological Surveys.—Dairy factory premises were surveyed as required, to define the causes of specific defects in dairy products.

Moisture Dispersal in Butter.—In co-operation with Division of Dairying, the size and dispersion of water droplets in butter manufactured in stainless steel churns were determined. The results have been a basis for recommendations in the variation of churn working times and cream temperatures, to achieve uniformly good body and texture in the finished butter.

Butter pH.—To improve the quality of butter made from high acid cream, commonly supplied to N.S.W. factories during hot summer months, and to reduce costs for such manufacture, several factories introduced the technique of pre-heating cream prior to vacreation. Laboratory determinations of serum pH from the resultant butter, allied with bacteriological analyses and sensory grading, were made available to the factories concerned.

Penicillin in Milk, Survey.—In co-operation with the N.S.W. Milk Board a survey of the incidence of penicillin in raw whole milk supplied to the Board from farmers within the Milk Zone was commenced. Penicillin in milk as the result of mastitis therapy is not yet a serious problem in N.S.W., but may become serious as the use of antibiotics for control of animal diseases increases.

The cylinder cup bicassay technique initially used in this survey has been replaced by a modified method. This involves the use of filter paper discs. It allows many more samples to be assayed in the same time.

The survey has been conducted on samples drawn from all the producing districts. Three hundred and eighty-three individual samples and eighteen bulk samples have been assayed, with a positive incidence of the order of 1-2 per cent. In the positive samples, the concentration of penicillin ranged from 0.05 International Units per ml. to a maximum of 2.2 I.U. per ml.

Penicillin Sensitivity of Mixed Strain Starter Cultures.—Sensitivity of some commercially used mixed strain starter cultures to penicillin was investigated in conjunction with the survey of penicillin incidence in milk. Cultures containing strains of *Streptococcus cremoris*, *Str. lactis*, *Leuconostoc* sp., *St. diacetylactis*, *Str. thermophilus* and *Str. durans* were included.

Streptococcus thermophilus was found to be the most sensitive organism. It exhibited a 30 per cent. reduction in acid production over six hours when exposed to a penicillin concentration of 0.01 I.U./ml. Concentrations of between 0.25 and 0.50 I.U./ml. were required to achieve similar results with the other cultures studied.

NITROGEN-FIXING BACTERIA

The effect of pasture establishment methods on nodulation in problem areas has been further examined in field trials sown this season in the Bellinger River, Clarence River and Wyong districts, in co-operation with Division of Plant Industry and Chemistry Branch.

Lime, and Lime Placement.—The importance of lime, and lime placement, in the nodulation of Clare Subterranean clover were demonstrated in the Bellinger River area. "No lime" treatments gave about 5 per cent. of plants nodulated, 2 cwt. of lime gave 12 per cent. when broadcast and 80 per cent. when banded, while 2 tons resulted in 90 per cent. nodulation whether banded or broadcast. With lime pelleted seed, broadcast, the nodulation percentage was 40; when banded it was about 60 per cent. The conclusion was that 2 cwt. of lime, banded, was the best recommendation.

Rhizobium Strain Trial.—Other trials on the Bellinger River site included a *Rhizobium* strain trial and summer legume observational plots.

The two *Rhizobium* strains now used in commercial peat cultures for clovers were tested singly and as a mixed inoculum. Clare sub-clover responded equally to both strains and to the mixture. Ladino white clover was nodulated by a native strain and thus did not give a significant response to either of the introduced strains or their mixture. There was a slight response. It would indicate the possibility that despite the effective native strain, inoculation would still be worth while.

Legume Observation Plots.—Summer legume species were sown with inoculum. All appeared to be effectively nodulated except *Leucaena glauca*, *Indigofera tetensens*, *Desmodium uncinatum* and *Stylosanthes gracilis*.

Factorial Experiment, Pasture Establishment, Wyong.—At Wyong a wide range of methods of pasture establishment have been compared in a factorial experiment involving super placement, lime placement and rate, seed placement, and lime pelleted seed versus bare seed. Good moisture conditions since sowing have delayed nodulation differences. Even so the standard 50/50 recommendation appears to be the most satisfactory treatment.

Study of Nodulation Difficulties in Sandy Upland, Coastal Soils.—At Grafton these were studied with Ladino white clover in establishment trials. The standard recommendation again



Rhizobium Inoculum in Commercial Cultures are Tested

Hundreds of legume plants are grown in individual test tubes under artificial light in the Biological Branch, to provide for tests of the effectiveness of various peat cultures of *Rhizobium*, the root nodule bacterium, on sale in country districts. Storage conditions have a marked effect on quality of the inoculant.

(Photo. from Biological Branch.)

proved the best treatment, giving 100 per cent. of plants nodulated. The poor performance of lime pelleted seed was of interest. It gave only 12-15 per cent. nodulated plants.

From this experiment it was concluded that nodulation is no difficulty in pasture establishment in this area if drill sowing of inoculated seed with 50-50 lime/super is carried out.

Interaction of Lime and Molybdenum in Nodulation of Lucerne.—This was studied on an alluvial soil at Grafton. Difficulties in sampling hindered nodulation counts. There were only slight differences in the degree of nodulation of the various treatments.

Summer Legume-Rhizobium Relationships.—Methods of growing some of the more promising sub-tropical legumes in glasshouse and plant tube culture are being studied. Legume species being studied are *Aeschynomene falcata*, *Desmodium uncinatum*, *Dolichos bifloris*, *Glycine falcata*, *Indigofera endecaphylla*, *Indigofera tectensis*, *Lotononis bainesii* and *Phaseolus bracteatus*.

Testing Commercial Inoculants.—The service initiated last year in co-operation with the University of Sydney has provided a comprehensive testing programme for the manufacturers.

The role of the Biological Branch has been to test peat inoculants which have been purchased in country districts; to provide information regarding the effect of transport and storage on the quality of the peat cultures.

It appears that storage conditions do have a marked effect on inoculant quality, and added emphasis will be given to this aspect next year. In order to accelerate legume growth in the laboratory for this testing six fluorescent light units have been installed.

Agar Cultures Distributed.—Some 586 agar cultures were distributed by the Biological Branch to Government Experiment Farms and district agronomists.

BEE DISEASES BACTERIOLOGY

Of twenty-five samples of adult bees submitted by the Apiary Branch, *Nosema* infection was found in eleven. In three samples of brood submitted, one probable case of American foul brood was detected.

Entomological Branch

Summary of Major Pests' Incidence.—Conditions were highly favourable to codling moth, black beetle, red scale, sheep blowfly and black soil scarab.

Several weevil pests, notably the white fringed weevil, also occurred in damaging numbers. Very little trouble was experienced from plague locusts, but army worms were very prevalent following the drought-breaking late summer rains.

FRUIT PESTS

Citrus Red Scale (*Aonidiella aurantii*).—A marked build-up in scale infestations occurred both in coastal and inland orchards during the autumn. Timely warnings of this likelihood were publicised with good effect.

The development of spray schedules including Malathion in combination with low concentration oil sprays has yielded confident recommendations for late season spraying where normal oil sprays would be risky to use.

Experimental work indicated the need for a post-bloom spraying followed by one in February, to control heavy scale infestations satisfactorily. It also demonstrated that an outside cover only was sufficient for the first spray in that schedule.

The inclusion of half strength white oil with organo-phosphorus insecticides increased their effectiveness; but such combinations, e.g. white oil and Trithion, can cause fruit marking. Gusathion or Tetram without the addition of white oil spray was not promising. There was little to choose between a so-called "superior" oil and a standard, white oil when applied at similar dilution rate.

White Wax Scale (*Ceroplastes destructor*).—High temperatures in December caused variable mortality in young white wax scales on the leaves. On drought-stricken trees that mortality approached 100 per cent. In districts where young wax scales emerged later and where egg hatching had only commenced at the time of the high temperatures, mortality was very much lower.

Experimental work again confirmed excellent control with well timed and thoroughly applied white oil sprays, whilst a combination of Gusathion and white oil at half strength gave very good results.

In a comparison of two methods of spray application using a "drive past" technique, very much improved control was obtained where inside and outside spraying were practised as compared with outside spraying alone. This was particularly so where trees were originally more heavily infested. It further emphasises that most of the unsatisfactory results reported by growers following the use of recommended materials are due to poor spraying.

Systemic insecticides Systox and Pestox showed some promise when applied whilst the young scales were on the leaves, and their further investigation is warranted.

White Louse Scale (*Unaspis citri*).—Colloidal or dispersible sulphurs used in combination with routine, "petal fall" copper fungicide sprays in spring continued to prove useful. Growers in general have welcomed this recommendation.

Tests of Malathion in combination with Bordeaux mixture have shown this combination to be ineffective for control of white louse scale, but when used in combination with neutral copper fungicides under similar conditions Malathion has given very good control.

Soft Brown Scale (*Coccus hesperidum*).—Timed applications of full strength white oil or combinations of half strength white oil and Malathion showed satisfactory control of this scale. Where ants were controlled, by trunk and ground spraying with dieldrin, results from all materials were markedly improved.

Citrus Gall Wasp (*Eurytoma fellis*).—Wasps emerged in large numbers during the hot, windy November and reinfested citrus trees. The area known to be infested in the County of Cumberland now extends in a westerly direction as far as Ermington and Parramatta where there are several large nurseries producing citrus trees for commercial citrus growing districts. No infestation has yet been reported from a major citrus growing area.

Fullers Rose Weevil (*Pantomorus godmani*).—Large numbers of adult weevils emerged after the late summer rains and attacked a wide variety of hosts. Citrus trees in many coastal orchards were infested but good control was established where dieldrin spraying and elimination of weed hosts by cultivation were practised.

Light Brown Apple Moth (*Tortrix postvittana*).—Seasonal conditions were quite unfavourable to this pest. No trouble was experienced until the late summer when some damage was noted in late apples. In codling moth control experiments it was noted that the organo-phosphorus insecticides Gusathion and Diazinon effectively controlled this pest but Trithion had little effect.

Mealybugs (*Pseudococcus spp.*).—Experiments on sultanias in the Lower Murray Irrigation Area against *P. longispinis* showed best control from two sprays of 0.05 per cent. Parathion applied in November and January, but this was not significantly superior either to the same spray applied only in January, or to 5 per cent. Malathion dust applied either twice, in November and January, or once only, in January. Two applications, in November and January, either of 0.1 per cent. Malathion or of 0.1 per cent. Diazinon, gave significantly inferior control to that given by 5 per cent. Malathion dust or by 0.05 per cent. Parathion spray applied at the same time.

Bronze Orange Bug (*Musgravea sulciventris*).—Infestations were generally light, although in some districts heavy populations occurred, especially on home garden trees and in irrigated orchards. During the very hot weather bugs descended from the tree canopy and clustered around the butts in a position where manual destruction was easy. This phenomenon is most marked when temperatures reach 105 degrees F. or higher.

Bud Mite in O'hanez Grapes (*Eriophyes vitis*).—Various reasons have been put forward to explain variable cropping in O'hanez grapes over a period of years.

Dissection examination of O'hanez buds from Griffith has shown variable and often heavy infestation of the tissues by a bud mite which appears to be a strain of the vine leaf blister mite *Eriophyes vitis*. Leaf and blossom primordia within the buds were more or less browned and leathery and in some cases dry and hard. Complete bud blasting was quite common where infestation was heavy.

Preliminary field trials with various miticidal sprays applied prior to bud burst showed, for the following materials, no appreciable reduction of bud mite infestation in the buds on current season's canes when these were examined in the autumn: Lime-sulphur 3/40; Lime-sulphur 1/20 + oil 1/100; Parathion 0.05 per cent.; Kelthane 0.05 per cent.; Chlorobenzilate 0.05 per cent.; Tedion V.18 0.04 per cent.; Diazinon 0.04 per cent.

A limited examination of buds on untreated canes in the spring, November, failed to reveal any evidence of mites in the buds or on the canes at that time. However, bud mite built up very heavily between then and April, and by that time considerable damage to bud tissue had occurred.

Codling Moth (*Cydia pomonella*).—Weather in the spring and summer particularly favoured this pest. It was very active, State-wide. Windy spring weather made spraying difficult, and

the high temperatures probably reduced the efficiency of DDT sprays. In many orchards the results with DDT were so unsatisfactory that growers sought other insecticides.

Malathion used in fortnightly schedules gave variable results, some very satisfactory and others less than good. Some growers complained that Malathion sprays close to harvest caused off-flavours in the harvested apples. This appeared to be associated with small fruit.

In experimental work at Orange, and some grower usage, Trithion gave satisfactory control; but where heavy population had built up prior to using Trithion, considerable calyx entries occurred even though side entries were prevented.

Gusathion in a three-weekly spray schedule gave best control of any material tested; whilst Trithion and Diazinon in a similar programme also gave good control of fruit entries, although noticeable stinging in the Diazinon treated plots indicated that the interval between sprays was too long.

The failure of DDT to give adequate control of codling moth in many orchards is thought to be due to a degree of resistance by this insect but this has not yet been verified.

Red Spider (*Tetranychus urticae*).—Many severe infestations developed on stone and pome fruit trees, especially where leguminous ground cover was plentiful during the spring. In many unirrigated orchards ground cover was lacking due to drought conditions and there red spider caused little trouble.

Experimental work at Orange indicated excellent control by Kelthane and Meta-systox applied in mid-January when rapid build-up was commencing. They kept trees free of infestation for 5-8 weeks. Then predator activity by *Stethorus* ladybirds eliminated any need for further sprays.

Malathion, as an emulsion or as wettable powder, applied twice, with an interval of twelve days between sprays, gave inferior protection.

When applied in a three-weekly schedule for codling moth control, Gusathion, Trithion and WCI gave complete control of spider whilst Malathion in a seasonal programme of 12-14 day intervals was satisfactory. In an orchard at Orange with a history of organo-phosphorus spraying, red spider resistance to this group of materials was observed in a block of Delicious apple trees.

Red Mite (*Bryobia praetiosa*).—During the period October to February severe infestations occurred on apples and to a lesser extent on stone fruits, in orchards throughout the State.

In experiments at Orange "superior oil" 1/100 plus lime-sulphur 1/20, or "superior oil" alone at 3/100, applied at green tip, gave excellent control until new year. Meta-systox, applied alone in early November, gave very good control for the remainder of the season. Growing-season sprays of Kelthane or Trithion gave complete control for the remainder of the season as did one application of HETP plus PCPPBS or Chlorocide. Malathion in a seasonal programme at 14-day intervals gave good control but was not effective when used as isolated applications.

Woolly Aphid (*Eriosoma lanigerum*).—This pest was generally not troublesome. Growing-season sprays of Malathion were effective but Trithion gave poor control.

Fruit Tree Moth Borer (*Cryptophaga unipuncta*).—Plum and prune trees in the Central Tablelands and M.I.A. showed heavy infestation by the larvae. It has been found at Orange that first-year larvae feed on the bark, eating out grooves in the surface of the wood, but do not tunnel until about early summer. It appears that the life cycle probably occupies two years, adult emergence taking place in December-January and young larvae appearing during late summer and autumn.

Injection of strong DDT emulsion into the tunnels effectively controlled these larvae and was more effective than kerosene.

Hydrangea Scale (*Pulvinaria sp.*).—This has been a widespread and troublesome garden pest in Sydney's northern suburbs in recent years, but infestations declined during the dry summer and following attacks by *Coccinellid* predators.

A small trial on hydrangea cuttings, with scales nearing maturity but before ovisacs were produced, showed promising control with the following materials: White oil 1/40 or 1/80. Malathion 0.2 per cent., Malathion 0.2 per cent. + White oil 1/80. White oil 1/80 + Lime-sulphur 1/40. White oil 1/80 + Nicotine sulphate 1/600. Parathion 0.1 per cent., Parathion 0.1 per cent. + White oil 1/80. Methyl parathion 0.1 per cent., Diazinon 0.1 per cent. and DDVP and Arachlor 0.1 per cent.

Unpromising results followed the use of dispersible sulphur 4 lb.: 100 gals., Systox 0.05 per cent., Gusathion 0.1 per cent., Thiodan 0.075 per cent., Tediol 0.1 per cent., Dipterex 0.1 per cent., Chlorthion 0.2 per cent.

White oil and Malathion were successful in a field trial.

Cottony Cushion Scale (*Icerya purchasi*).—Various ornamental and native plants heavily infested were received from Lord Howe Island where this insect is causing residents considerable concern. The scale is very satisfactorily checked on the mainland by natural enemies, but on the island these predators and parasites either are not present or are temporarily too few to give effective control.

San José Scale (*Quadraspidiotus perniciosus*).—Infestations have developed appreciably in recent years and caused heavy damage in some districts. In the M.I.A., peach and pear trees have been the main varieties infested and in some instances large branches have been killed.

Routine, winter control measures have been carried out in some of the orchards but initial infestations have been so heavy that special spray programmes appear to be required, to reduce the scale population to a level where routine treatments may reasonably check the pest.

Pinhole Borers (*Xyleborus pseudoangustatus*).—Adults and larvae were associated with dead and dying wood in apricot and prune trees at Griffith during the spring.

These insects have been taken frequently on stone and pome fruit trees in coastal districts and are suspected of association with dissemination of the fungus *Dothiorella*. The role of these insects is not yet clear.

Banana Beetle Borer (*Cosmopolites sordidus*).—In a long-term experiment at Condong, which will proceed until evidence of insecticidal breakdown, it has been demonstrated to date that (a) Dieldrin $\frac{1}{2}$ lb. per acre quickly reduces high populations of *Cosmopolites* and is effective for a prolonged period; (b) low and high volume dieldrin ground and butt sprays are equally effective; (c) total ground sprays of dieldrin (e.g., as included in weed control sprays) give similar results to butt sprays; (d) both aldrin and dieldrin high volume butt sprays at rates of 2 lb. and 1 lb. per acre respectively remain effective for at least eighteen months.

In an experiment at Clothiers Creek to evaluate combined control of beetle borer and rust thrips, dieldrin and aldrin effectiveness against *Cosmopolites* were again demonstrated. Aldrin at 17 oz. per acre, and dieldrin at 5 oz. per acre, as ground and butt treatments, gave very good results. Both dieldrin dust and diazinon spray reduced *Cosmopolites* but not sufficiently to warrant their use, especially diazinon.

Banana Rust Thrips (*Scirtothrips signipennis*).—From the immediate forementioned experiment it was observed that although rust thrips were numerous on the stems of the plants in some plots for the greater part of the period in which bunches were tagged, very few thrips were noted on the bunches.

It seemed likely that all the insecticides restricted the upward migration of thrips from the stems to the fruit. Whether migration could be so contained under plague conditions is uncertain.

Queensland Fruit Fly (*Dacus tyroni*).—Conditions in the spring and early summer were in general unsuitable for fruit fly development. When the drought broke in late summer the fly built up in late pome fruits and citrus.

Some inland infestations occurred. The fly was reported from Hillston and Narrandera, thus preventing export of Murrumbidgee Irrigation Areas' citrus for a further twelve months.

In addition, fruit fly was reported for the first time at Dareton. This had the effect of excluding from the New Zealand market, for a further twelve months, citrus produced in the Lower Murray districts.

These occurrences in districts where export is vital further emphasise the need for a satisfactory community treatment to enable shipping of citrus from such areas to take place in seasons when fly is found in the respective area. They underline the value of the extensive investigations at the Citrus Wastage Laboratory, Gosford, aimed at such treatment.

That work has reached a stage where the concentration of residual ethylene di bromide within the fruit, sufficient to kill 100 per cent. of the maggots, has been determined. In 102 fumigations in which no less than 2 parts per million of EDB were retained in the juice of the fruits, 63,399 larvae were treated; with no effective survivors.

Future investigations will concentrate on how such concentrations may be best obtained under large-scale commercial conditions. Some dipping tests with EDB emulsions have been satisfactory and this promising line is being further explored.

No evidence of fruit fly was seen at Corowa this season, following careful clean-up measures last autumn and winter after heavy infestation in early autumn.

Protein hydrolysates of yeast and malathion as a foliage bait are under detailed study in trials to determine the most practical means of application. Promising local and imported protein hydrolysates have been found to be effective and some are at present commercially available.

These materials act as powerful attractants and are the most satisfactory so far tested. In general the more concentrated the bait the more attractive it is and the longer it remains useful. Variable results followed the addition of sugar to the baits and degradation of such baits by micro-organisms in the foliage may be important. Some attempt has been made to elucidate these aspects by the experimental addition of preservatives.

Large tree-cage trials were conducted, further to investigate principles in field exposure of attractant baits and to compare the toxicants malathion, parathion, dipterex, trithion, gusathion, and 4870, at a standard rate of 1.5 per cent. toxicant in combination with a constant dosage of 1.5 per cent. protein as protein hydrolysate. All these insecticides were satisfactory, but thrithion appeared best.

In tests of different applications of malathion and protein hydrolysate of yeast, best maggot reduction in suspended pricked apples in the cages over a weekly or fortnightly period was obtained with a dosage on the tree of 1.7 cc., containing 15 per cent. of each ingredient. On the other hand, best numerical knockdown of female flies occurred with a dosage on the tree of 17 cc., containing 1.5 per cent. of each ingredient, plus 50 per cent. sugar.

In a small suburban block of about 150 trees, mainly maturing in January, moderate stinging was occurring when a weekly splash bait schedule of $\frac{1}{2}$ lb. protein hydrolysate of yeast powder, plus $\frac{1}{2}$ lb. malathion, plus 2 lbs. sugar, per acre was commenced. Stinging ceased and did not re-occur until two weeks after the completion of the programme of three sprays. This result was a big improvement on a similar attempt in the same block in January, 1956, to protect peach trees in the same way with the same protein plus malathion at one-tenth of the dosage.

An unusual record of Queensland fruit fly this season was a heavy infestation of almonds whilst the husks were green, at Manly in December, 1957. Another unusual occurrence was the accidental introduction, in a package of bananas intercepted at Griffith, of a fruit fly tentatively determined as *Dacus emarginatus*. The bananas were consigned from the north coast.

VEGETABLE PESTS

Bean Fly (*Agromyza phaseoli*).—Large infestations in coastal areas north of Sydney during late summer and the autumn occurred on bean, cowpea and soybean crops. Commercial bean growers generally adopt routine measures for control of this pest and losses are rare. Late-sown cowpeas, however, are not protected, and this time were heavily damaged.

Tests with bean seeds dipped in kerosene solutions of different insecticides before planting showed aldrin, dieldrin or lindane protection of the resulting plants, lasting for several weeks.

Red Spider (*Tetranychus spp.*).—The dry, hot spring favoured red spider development on beans and cucumbers. Some very heavy infestations built up.

Spraying trials at Gosford showed that Phencaptone and Trithion were outstanding as miticides for bean crops. Their protective effect withstood conditions favouring severe infestation and re-infestation. Avoidance of infestation by good cultural practices and prompt disposal of spent crop residues was seen to be the most important practice.

Pumpkin Beetle (*Aulacophora hilaris*).—Considerable trouble occurred inland, especially, and rock-melon crops in the M.I.A. were heavily attacked during the late spring.

Spraying trials at Gosford showed good initial kill of beetles and subsequent protection of the plants for some days by both dieldrin and methoxychlor. Further trials indicated no injury from five applications of these materials to cucumbers or rock melons; but DDT caused varying degrees of yellowing and stunting, especially on cucumbers.

Cabbage White Butterfly (*Pieris rapae*).—Heavy infestations occurred in many districts during autumn, and activity persisted into early winter.

Spraying trials at Gosford showed satisfactory control under moderate intensity of infestation by either diazinon or a combined spray of DDT + malathion applied weekly over the tops of the plants.

Tomato Pests: (*Heliothis armigera* and *Vasates lycopersici*).—Good control of *Heliothis* followed the use of DDT sprays, either in emulsion or wettable powder forms; but injury followed the use of either when in combination with dispersible sulphur. Routine sprays of Zineb did not control a light infestation of tomato mite.

Tomato Stem Borer (*Gnorimoschema plaesiosema*).—Unusually heavy infestations occurred in tomato crops in the metropolitan area in the spring. This may have been because many growers have substituted other insecticides for DDT in recent years, contrary to Departmental recommendations.

FIELD CROP AND PASTURE PESTS

Plague Locust (*Chortoicetes terminifera*).—Conditions were unsuitable for swarm formation in all parts of N.S.W., although extensive scattered populations of mixed grasshopper species have been reported from the South Coast, Hunter Valley and Northern Tablelands and Slopes during January to March, 1958.

In a sample population from Tamworth, 55 per cent. were *C. terminifera*, of which more than half were females mostly containing fully developed eggs. Some 16 per cent. of the females and 5 per cent. of the males were parasitised internally by larvae of the fly *Locustivora pachytyli*, and up to three larvae per locust were recorded. In a Merriwa sample more than 30 per cent. of the locusts contained Dipterous larvae, which remained in moist sand for more than seven weeks without feeding or pupating.

No field campaign on locust control was carried out during the year owing to the lack of activity, but the drift spray droplet spectrum obtained with a new type micron sprayer was field tested. Twenty of these were purchased for use in the proposed Trial Control Campaign to be carried out when suitable conditions occur in the No. 1 outbreak area.

Analysis of the deposit on magnesium oxide coated slides showed that total ground recovery over 140 yards in calm air was good and 80 per cent. recovery was obtained. Droplets less than 65 microns comprised 50 per cent. of the total number recovered, but these represented only 10 per cent. of the volume. Similarly, 72 per cent. of the volume was in the 40-120 micron range and 27 per cent. in the 80-100 micron range. The volume median diameter was 100 microns.

Current information, together with records obtained since 1932, have been plotted on large State maps, and this information, supplemented by experience obtained in the 1953-55 outbreaks, is being prepared for publication. The material will deal with the question of suspected origin of major locust plagues.

Other Grasshoppers.—Localised swarms of grasshoppers were reported from several areas. The most important were: from Tamworth—*Oedaleus australis* and also *Acrida conica*, *Ailopus* sp., and *Ecphantus* sp.; from Carinda/Quambone—*Peakesia fuscomaculata*, *Pereltrana* sp., *Acrida turetta* and *O. australis*; from Merriwa—*O. australis* and *Pycnostictus* sp. At Carinda, *P. fuscomaculata* was noted in plague numbers over an area of more than 1,000 acres in April, 1958.

Pasture Scarab (*Aphodius howitti*).—A considerable increase occurred on the Central and Southern Tablelands and Slopes in the spring of 1957, when surface activity became evident much later than usual. Infestation was again widespread from about mid-May, 1958, after a light general rain, and improved pastures were extensively damaged where timely treatment was not carried out.

In experiments at Orange, superphosphate in combination with BHC at 2 or 4 oz. per acre, applied by a combine or spinner type fertiliser spreader, to a heavily infested pasture, strikingly reduced surface activity. Grub mortality was high, from all treatments. Distribution was more even and results were better with the combine than with the spinner type fertiliser distributor.

Brown Wheat Mite (*Petrobia latens*).—Improved pastures in many parts of the Central Tablelands were heavily attacked in the spring. Severe injury was caused, especially to rye grasses and clovers, white clover in particular. Pastures deteriorated as rapidly as if severely affected by frost and plants became yellowed and withered.

This pest was first recorded in this State at Inverell in 1929, where it attacked wheat crops. It is distinctly a pest favoured by dry weather. Good falls of rain soon put an end to the infestations.

Low-volume boom spray trials indicated that parathion at the rate of 2½ oz. active ingredient per acre gave good control; but malathion was not effective.

Bean and Melon Aphids (*Aphis craccivora* and *Aphis gossypii*).—Young seedling lucerne stands were heavily infested by colonies of these aphids late in autumn over a wide area on the Central Western Slopes.

Red-legged Earth Mite (*Halotydeus destructor* and *Penthaleus major*).—These mites were prevalent in lucerne and clover over a wide area late in autumn. *Penthaleus* was the dominant genus in most of the central-western slopes area, but in the more southern parts of the State *Halotydeus* was generally present.

Treatment of infested pasture or crops with DDT at 4 oz. active ingredient per acre has given very good control, but mixtures of DDT and parathion at low per acre dosage rates have failed.

Black Soil Scarab (*Othnonius batesii*).—Reports in 1953 from the Nevertire district indicated that the larvae had eaten out big areas of native pastures on dark-grey myall country. Now further evidence of the pests' activity has come from black soil areas in the north-west of the State. Very heavy damage to native and sown pastures, and cereal crops, has occurred in the Oakwood, Graman, Grogan and Delungra areas on the black and chocolate basaltic soils. It is estimated that 50,000 acres are infested there. Patchy infestations have been known there for years, but in the past two seasons these have spread and merged into extensive areas sometimes of several hundred acres. Pastures on the "grubby" areas may be completely denuded and stock forced to concentrate on less affected areas, quickly reducing many large areas to a nil carrying capacity. On the affected areas, pasture is replaced by useless or noxious plants, including bindii, darling pea, mintweed, etc.

Probably the most serious aspect of grub infestation is these self-mulching soils' consequent exposure to erosion. They are churned up to a fluffy texture by the activities of the beetles and grubs. The hillcrests and slopes are particularly susceptible to infestation, so the erosion hazard is serious.

Investigations into the biology, habits and control of the pest have commenced, and an officer will be located at Graman full time in the near future for the study. Some interesting aspects of the insect's life-history have already been found, and beetle flights are known to occur from mid-December to mid-March. Whilst the males are strong fliers the females fly only infrequently. Beetle flights are stimulated by rainfall of a certain intensity.

Insecticidal tests indicate that DDT, BHC and dieldrin have an effect on the first and second stage larvae, and dieldrin has given a significant overall reduction in the total population.

Pruinose Scarab (*Serithesthis pruinosa*).—The larvae have considerably damaged pastures, especially in the Dorrigo district. Some control trials have been laid down there. Diazinon appears to be giving some promise against the larvae in the soil.

Wheat Root Grub (*Anodontonyx noxious*).—The larvae damaged wheat and oat crops sown on red soils, especially in the Tamworth district. Experiments have shown that treatment of infested soil prior to sowing, with aldrin, dieldrin, thiodan or diazinon, at 4 lb. active ingredient per acre, gives good protection of the germinated crop and very substantial reduction in larvae in the soil.

Black Beetle (*Heteronychus sanctae-helenae*).—As anticipated, moderate numbers of overwintered beetles gave trouble in susceptible spring-sown crops, and damage to maize and potato crops as reported from the Clarence River district in October. Below-average rainfall during spring and summer, for the second year in succession, favoured a considerable build-up in populations; and extensive larval damage to pasture was reported in January, 1958. The beetles are overwintering in many coastal districts in large numbers at present, and plague development in the coming spring is expected.

White-Fringed Weevil (*Pantomorus leucoloma*).—Their abundance and damage during the past season were greater than at any previous period. Infestations were widespread in many coastal and inland areas. Some lucerne and clover pastures were heavily attacked, especially on alluvial flats.

In a trial at Wingham, on irrigated two and a half year old Ladino clover pasture, sprayed in January with dieldrin at the rate of 3 lb. per acre and irrigated immediately afterwards

there appeared to be freedom from infestation in July, 1957, whereas in nearby untreated pasture up to six larvae per square foot were found. No similar reduction in larvae was noted in pasture treated with dipterex or thiodan.

Lucerne Flea (*Smynturus viridis*).—This appreciably damaged lucerne at Canowindra in August, 1957, and cases were "reported" at Cowra, Wagga and Leeton. In the latter case the insect proved to be unimportant springtail *Katianna ornata* which was readily controlled by spraying with diazinon, 1 oz. per acre. The other "cases" could not be checked.

Clover Weevil (*Amnemus quadrituberculatus*).—Investigations have been continued in the North Coast region by the district entomologist and a University of Sydney entomologist. These are part of the project being carried out by the Department of Agriculture-Sydney University Pasture Research Team.

Life-history studies have shown that adult weevils commence emergence in late spring-early summer, emergence being strongly correlated with rainfall. Adult activity was marked in summer and autumn, but numbers declined gradually through late autumn and early winter. The bulk of egg-laying occurs during the February-April period and adults may lay from 1,000 to 2,000 eggs during the three-four month incubation period. Hatching takes about nine-thirteen days and larvae appear to do their maximum damage in late autumn and early winter. The larval stage may be completed in about three months in the laboratory, but is longer in the field.

Surveys indicate a wide distribution in coastal districts in eastern Australia. The pest is in economically important numbers from the Manning River in N.S.W. to at least as far north as Beerwah in Queensland. It appears to be confined to coastal and near-coastal districts.

Two widely distributed native leguminous shrubs, *Jacksonia scoparia* and *Pultenea* sp., are commonly infested hosts of the adult, and weevils have been found in them in bush country isolated from pasture areas.

Trials have been carried out with various insecticides and at different times of the year, on established clover pastures and on newly-sown areas. The results have been affected either by drought or heavy rust infection, but indicate promise by dieldrin at 2 lb. per acre in January, when beetle activity becomes marked. In many of these trials results have not yet been assessed.

Experiments with sod-seeded subterranean clover treated with various insecticides at sowing showed that bacterial nodulation by *Rhizobium* was affected only slightly by aldrin, dieldrin and chlordane. Affects were mainly reflected as crown nodulation. DDT, and BHC in particular, were more drastic, and their use with inoculated seed cannot be recommended.

Underground Grass Grubs Attacking Crops (*Hepialidae*).—Severe, localised damage to wheat, oat and barley crops by larvae of a *Hepialid* moth resembling *Oncopera* sp. occurred in the Delungra, Tamworth and Narrabri areas. Lawn and pasture damage also occurred on the Northern Tablelands at Ebor and also in the Central Tablelands at Orange. DDT 8 oz. per acre was recommended for control.

Turnip Aphid (*Brevicoryne brassicae*).—Very heavy infestations of the slaty grey aphid occurred in Northern Tableland swede turnip crops in the autumn. In one instance 80 acres of crop were almost wiped out. By this time almost complete parasitism of the aphids by a wasp parasite had occurred.

Rice Beetle (*Dicranolaius bellulus*).—Adults were numerous amongst rice crops in the M.I.A. during February-March, 1958, and did some damage by feeding upon the developing grain in the heads. Generally speaking, the injury was not extensive and was largely confined to the marginal strips around the bays. Light aircraft were employed to treat affected crops with DDT and over 2,000 acres of crop were treated.

Lucerne Leafhoppers (*Jassidae*).—In late May, and June, 1958, jassids infested lucerne quite severely around Canowindra; mottling and yellowing the foliage. It is unusual for these pests to be active so late in the season. DDT at 4 oz. per acre applied in early June gave excellent control.

Lawn Grass Flea-Beetle (*Plectroscelis* sp.).—Lawn grasses were severely damaged by adult flea beetles during the dry summer, in places as widely separated as Terrigal, Griffith and Wagga. At Terrigal severe damage and browning off occurred to a couch grass bowling green. Infestation subsided following an application of DDT spray.

STORED PRODUCTS PESTS

Wheat Weevil (*Calandra granaria* and *C. oryzae*).—No ill-effects on germination immediately followed the fumigation of Festival wheat having a moisture content of 11 per cent.,

when Phostoxin tablets were used at the standard rate of 5 tablets per 40 bushels, and at twice that dosage. In a small-scale trial the inadequacy of using Phostoxin tablets under less than gas-tight conditions was again demonstrated. Heavily infested wheat treated at the rate of one tablet per 3 bushel bag for five days under a tarpaulin showed a complete kill of *Tribolium* sp., a 98 per cent. kill of *Calandra oryzae* (small strain), and 99 per cent. kill of *Rhizopertha dominica* adults.

The value of a hammer mill in ridding wheat of insect infestation was demonstrated. The average count per pint of wheat before milling showed 188 adults of *Calandra oryzae* (small strain), 32 *Tribolium castaneum*, 89 *Rhizopertha dominica*, 4 *Cryptolestes* (*Laemophloeus*) sp., one *Oryzaephilus* and one Cadelle (larva). Only two live adult *C. oryzae* were present in the whole of the three bushels after milling.

Flour Insect Investigations.—Successful trials were run in Sydney flour mills on the use of ethylene di bromide—ethylene di chloride spot fumigants in the elevator boots. Previous investigations had shown the boots to be the main insect distribution points in flour mills. The spot fumigants have been coupled with a regular sanitation programme.

Stored Products Moths (*Ephestia* spp.).—Chocolate manufacturers, flour millers, warehousemen and general food processors have sought advice on control of *E. kuhniella*, *E. eleutella* and other *Ephestia* spp. in stored cocoa beans, tobacco, flour biscuits, dried fruit and general produce. Chocolate manufacturers have been mainly concerned. They handle thousands of tons of imported cocoa beans each year.

Pyrethrum sprays applied weekly at change of light (mainly dusk) have been of value with low populations, and fumigation is often needed shortly after arrival from West Indies and West Africa.

HOUSEHOLD PESTS

Carpet Beetles (*Anthrenus* spp., *Anthrenocerus australis* and *Attagenus piceus*).—Knitting wool treated with 2 per cent. chlordane, 1 per cent. and .05 per cent. dieldrin, and pyrethrum, has been exposed to larvae of the three carpet beetles and observations have been made on time of cessation of feeding. Pyrethrum gave an immediate and total kill. Cessation of movement of body and appendages of 50 per cent. of larvae did not occur in the dieldrin treatments until eight days after exposure, whilst with chlordane fourteen days elapsed.

Orange Barred Grass Moth (*Eutane terminalis*).—During the late winter, larvae of this moth were commonly reported swarming on house walls in north harbour suburbs. These were successfully controlled with 0.5 per cent. diazinon wettable power spray, whilst the emulsion sprays were inferior.

Ants.—Especially during the months of February and March, numbers of ant specimens were examined and identified.

The most common household ant pests in the Sydney area (apart from Argentine ants) are *Pheidole megacephala*, *Iridomyrmex darwinianus* and/or *Tapinoma minutum*, *Technomyrmex albus*, *Iridomyrmex punctatissima* and several *Monomorium* spp. including *M. pharacnis* and *M. sydneyensis*.

Ants found commonly in the open but also household pests are *Tetramorium guineense*, *Iridomyrmex rufoniger* and *I. nitidus*.

Considerable difficulty in establishing Buffel grass has been experienced in several far western areas due to the seed-collecting activity of various harvesting ants. Several ants are involved, including *Pheidole deserticola*, *Melophorus biroi*, *M. turneri*, *Pheidole baucis*, *Holcomymex whitei*, *Pheidole variabilis* and *Monomorium rothsteini*.

Field investigations conducted with the Postmaster-General's Department demonstrated that damage to the black polyvinyl chloride covering of telephone cables was being caused by the Coastal brown ant *Pheidole megacephala*.

Argentine Ant Eradication Campaign.—The rate of spread of Argentine ants has not been as great as in previous years, perhaps due to the extremely dry spring and early summer. Activity increased late in summer and continued at a comparatively high rate to the end of May, 1958.

The total area now known to have been infested is approximately 3,500 acres in 178 different areas. During the 1957-8 season the total area sprayed was 439 acres, including 9.1 acres "spot" sprayed; and 52,645 gallons of dieldrin spray were used. Of forty-six areas checked-surveyed during the year, forty were apparently free from Argentine ants. Some ants were found on twelve properties out of 1,661 surveyed. The total cost of the campaign to 29th May, 1958, has been £67,200.

Houseflies (*Musca domestica*).—Considerable trouble has been experienced from houseflies breeding in fowl droppings accumulated beneath cages where this intensive system of poultry raising is carried out.

Diazinon dust at the rate of 100 milligrams per square foot of surface, applied to manure infested with housefly larvae, gave complete mortality of the larvae within twenty-four hours. Diazinon is toxic to larvae shortly after the application, and large numbers are affected within four hours. The dust was merely applied to the surface of the manure beneath the cages.

Boonery Bugs (*Leptocoris lurida*).—Many inquiries were received in the summer from landholders in western and north-western districts concerning swarms of these plant bugs in and about houses and outbuildings. These bugs breed in large numbers on the Boonery or Rosewood (*Heterodendron oleifolium*), a widely dispersed shrub or small tree in those regions.

White Ants (Termitidae).—Many inquiries from metropolitan and country areas concerned termites attacking houses and structures, fruit and shade trees, and vegetables.

The major pest termite in the metropolitan area, and probably in country towns, is *Coptotermes acinaciformis*. Flights of winged sexuals were noticeable under hot muggy conditions in November, December and January. *Coptotermes lacteus* infested a commercial planting of tree tomatoes at Kurrajong, on land recently cleared of virgin scrub. Chlordane treatment of nearby mounds controlled this termite. *Nasutitermes exitiosus* causes widespread damage to fencing in outlying suburbs and country districts but its obligatory mould building habit restricts its spread in built-up areas.

Investigations in collaboration with the Division of Wood Technology, Department of Conservation, over the past three years have shown that pine blocks, painted with various insecticides and buried in a circle about a large mound of *C. lacteus*, were only slightly protected by creosote, pentachlorophenol 5 per cent., chlordane 2 per cent., or dieldrin 1 per cent. No protection was afforded by kerosene, dichloroethyl ether or sodium pentachlorophenate. It is thought that extensive wood rotting helped the breakdown of the insecticide barrier in many instances.

Blocks treated with urea remained relatively sound for three years and this material warrants further testing as a repellent.

Experimental treatments of buildings with dieldrin against *C. acinaciformis* have given indications of good protection over periods of three-four years.

Laboratory colonies of different termite species have been set up in large glass test tubes (8 in. x 1 in.) containing plaster of paris moulds, or columns of fine sand, and a moisture gradient is provided. Healthy groups of 10-20 workers with and without soldiers of both *N. exitiosus* and *C. acinaciformis* have been maintained for over a fortnight without food. It is hoped to use these colonies to test soil samples from experimentally treated sites.

Large colonies of the Reduviid bug, *Tegea atropicta*, were observed clustering around the earthen galleries of *N. exitiosus* in March, 1958. Behaviour studies of these bugs in relation to the termite were made in the laboratory colonies. They demonstrated that the bugs are predatory on the termites; feeding through the head capsule of the termite, through the then walled gallery.

WEED INSECTS

Fireweed attacked by mites and insects.—Fireweed (*Senecio vulgaris*) was found to be heavily infested with Eriophyid mites in the Casino district. It is the first time that these mites have been found associated with this plant, but the occurrence is not considered to have importance from the point of view of biological control. Larvae of the moth *Homoesoma farinalis* also attacked fireweed on the North Coast and caused some reduction in growth of this weed.

QUARANTINE

Bamboo Borers (*Dinoderus minutus*) in Imported Utensils. —Numerous enquiries were received during November, 1957, concerning borer attack in bamboo handles of cutlery and kitchen utensils imported from Japan. Fumigation with methyl bromide was recommended.

Cut Flowers from Japan and United Kingdom.—Chrysanthemum blooms imported by air for exhibition at a flower show in a well-known city store were found to be infested with *Aphis gossypii*, springtails, and *Orabatiid* mites.

ANIMAL ECTOPARASITES

Sheep itch mite (*Psorergates ovis*).—Preliminary, miticide screening investigations were conducted at the Glenfield Veterinary Research Station using groups of two sheep dipped in various chemicals. The results were determined periodically by microscopic observations of a number of skin scrapings.

The following were found to kill itch mite when applied through a plunge dip: CX99 (Delta and gamma BHC), arsenic-sulphur, lime-sulphur, sodium arsenite, malathion and Neguvon. The following were not satisfactory: Dithane, phencaptone, chlorobenzilate, chloro-propylate and orthodichloro benzene plus DDT.

Sheep Blowfly (*Lucilia cuprina*).—During the period December to May sheep blowfly strike, especially breech strike of ewes, and poll strike of rams, became very troublesome in most parts of N.S.W. except the far west. In this period, resistance to aldrin and dieldrin became established on a number of properties.

The trend towards surface application of aldrin, dieldrin and diazinon continued during the year, with a widespread use of low-volume spray races.

Diazinon was used increasingly for sheep blowfly control but several complaints of its failure to protect sheep from blowflies were heard.

Laboratory demonstration of resistance to dieldrin by *Lucilia cuprina* in December, 1957, was soon followed by reports that sheep were being struck 2-14 days after jetting with either aldrin or dieldrin. In these cases it was usually found that aldrin and dieldrin had been used for two to three years, and that a proportion of larvae remained in strikes after swabbing with these materials at strengths above the normal recommended concentration.

Resistance to both aldrin and dieldrin was found in a field strain of *L. cuprina* from Condobolin in December, and adult females were found to be not less than 100-200 times, and more than seventy-five times, more resistant to dieldrin and aldrin than a standard laboratory strain. Larvae of the resistant strain were able to withstand immersion in 2 per cent. dieldrin, with high emergence of adult flies, whilst immersion of larvae of the susceptible strain in 0.05 per cent. dieldrin was lethal to them. Strikes developed on sheep which had been jetted with aldrin or dieldrin at up to four times normal jetting strength, from larvae implanted on the animals shortly after treatment.

Specimens of normal and resistant strains were sent to the Cooper Technical Bureau laboratory for resistance testing, and resistance to dieldrin was confirmed there. Tests with diazinon showed on immersion of prepupae in 8 to 20 p.p.m. diazinon emulsion for five minutes, that these appear to be the lower and upper toxicity limits.

Difficulty was experienced in transferring this information to extract samples, and lanoline or heat may have reduced the biological efficiency of the insecticides in the samples received for testing. The lanoline content also appears to be interfering in adult toxicity tests.

The working range with diazinon liquids against adults is in the range between 0.002 per cent. and 0.01 per cent. concentration.

ENTOMOLOGICAL COLLECTION

Check on Weevil Collection.—A brief check on the collection indicated that there are about seventeen major weevil pests in this State; over forty other species are noted and identified and a number of other specimens are unnamed.

During the autumn of 1958 an unusual number of reports was received concerning attacks by different types of weevils of crops and plants. Several infestations of small brown weevils of the genus *Floresisanus* sp. were reported from county of Cumberland, where they were feeding upon garden plants and swarming in large numbers over walls and fences. The only previous record of this insect was in 1941 where they fed on Iceland poppies at Croydon.

The deficiencies in the collection were shown up when endeavouring to identify some of these weevils and large and important genera, e.g. *Meremnites*, *Desiantha*, *Mandalotus*, *Polyphrades*, etc., have frequently been represented by odd named species only. A number of species of *Perperus* could not be identified at the British Museum and many members of this group are major or minor pests. It is doubtful if any Australian weevils have been described since the death of

A. M. Lea in 1932 and the need for taxonomic work on the *Curculionidae*, the largest and economically the most important of insect families, is obvious.

Species of Insects Newly Noted or Described.—New species of insects noted or described during the year include a Mirid bug of a new genus close to *Duthmaris*; four new species of *Coccidae* to be described by A. R. Brimblecombe; an Elaterid *Hapatesus pervulgatus*, referred to by A. Nebioss in a paper in Aust. J. Zool. 5 (4) 496-520; a Scarab *Marchidius chadwicki*, described by E. B. Britton in his Revision of Australian Chafers, Vol. 1, p. 140; new species of *Tabanidae* in material sent to Dr. Mackerras; a new species of *Hilara* (*Empididae*) recognised by G. H. Hardy; a lacewing thought to be *Heterithone megacerca* Till. but now considered by E. F. Rick to be an undescribed species; an undescribed *Tortricid* recognised by I. F. B. Common; an undescribed species of *Arachnid* of the genus *Dictyna* identified by Professor Hickman; also a species of *Nicodamus*.

Insect Cabinets.—Four ten-drawer steel entomological cabinets were received, making twenty-eight such cabinets now available for the proper arrangement of the insect reference collection.

Chemist Branch

STAFF

Mr. L. Jones, Cereal Technician, retired during the year. The degree of Doctor of Philosophy was awarded respectively to Messrs. B. D. Davey and R. R. Storrier and the degree of Master of Science to Mr. D. K. O'Neill.

CEREAL SECTION

The Crop Year in re Wheat Quality.—Weather conditions were not conducive to high yield but the grain was bright, well filled and of high bushel weight. The declared bushel weight of the grain, 64½ lb., is particularly high, since most of the f.a.q. wheat was delivered from southern areas.

The dry conditions were responsible for improvement in the general quality of the grain compared to that of 1956-57. Protein content of the f.a.q. grain was 11.0 per cent., compared to 10.0 per cent. for 1956-57 f.a.q. wheat from the northern zone, and 9.2 per cent. for 1956-57 wheat from the western and southern zone.

By early spring it was apparent that high-quality premium wheat would be in extremely short supply and that millers would be unable to purchase sufficient to meet the demand on them for high protein flour. This became more clear as harvest approached; but it was also evident that the quality standard of the limited wheat from the northern wheat-growing areas would be much higher than normal.

From the 1957 crop, 1,108,655 bushels were purchased by millers at a premium above the f.a.q. price; as against more than 4,000,000 bushels each year for the three preceding years and over 5,000,000 bushels from the 1953-54 crop. The figures reflect the drought effect on yield in 1957.

Naturally, prices were higher than those paid in previous years. The premiums ranged up to a record of 8s. per bushel; and many parcels sold at well in advance of previous record prices. Average premium price was 2s. 8.82d. per bushel, a record. From the 1956 crop, the highest premium was 4s. 6d., and the average 1s. 7.25d. per bushel.

Wheat Quality Investigations.—Work continued on methods of assessing relative baking quality of wheat varieties, particularly in view of the suggestion that susceptibility of the starch fraction of the grain to damage during the milling process may be more important in determining baking quality than are the quantity and physical characteristics of the protein.

Experimental baking procedures do not necessarily duplicate commercial practices accurately. In addition, flour millers work on mixed grists. Thus, complementary characteristics of varieties must be considered.

Use of physical, dough testing instruments to determine flour quality eliminates personal errors of different operators, and provides some information that cannot readily be obtained from a baking test, but it is essential to confirm the results by baking trials. Because no single baking test will disclose all the features of flour quality, it is necessary to adopt a number of different procedures.

During the year studies were made of the effect of damaged starch on baking quality; and different baking procedures were reviewed with a view to assessing the range in procedure

necessary to disclose flour quality accurately. Evidence could not be found to support the view that susceptibility of starch to damage during the milling process is more important than protein quantity and protein quality.

Cereal Control Work.—One hundred and ninety-eight samples of flour were examined for provision of export certificates, compared to 504 samples in 1956-57 and 303 samples in 1955-56.

All were submitted before the end of December, 1957; and many again represented comparatively small tonnages of flour, exported by private firms to established customers. Some of the certificates were required to show certified analyses, as the flour markets were highly competitive and importers were anxious to receive flour of the quality to which their clients had been accustomed.

The areas from which high quality wheat is normally purchased by millers at a premium above the f.a.q. price were some of the most severely affected by the dry seasonal conditions, and as the crop year progressed it appeared that even sufficient grain to meet seed requirements for the 1958 sowing would not be produced.

Premium Wheat Growers' Association.—Farmers in the northern wheat-growing areas had taken steps to establish their own organisation for marketing high quality wheat. They had intended to initiate operations during the 1957-58 harvest. During the year, assistance was given to them to develop their organisation.

It was proposed that the wheat be segregated at points of receipt, by adopting an empirical test, and that it ultimately be sold on the basis of protein content. The proposal for marketing on protein content aroused interest in other States. It was a major departure from marketing systems in Australia, and could be the forerunner of a more extensive grading system.

Competition for the limited amount of high quality wheat was very keen, indicated by the high premium prices. Millers sought information on the quality of varieties that might provide complementary, quality characteristics, to offset the shortage of the recognised standard varieties.

Payment of premiums by millers has been an incentive to farmers to improve the quality of their grain. Any assistance that can be given to improve marketing facilities will make a larger quantity of high quality wheat available to millers, and so extend the benefit of the higher returns to farmers.

Assistance to Commonwealth Technical Committee.—A Technical Committee on Wheat Quality was set up by the Commonwealth Government to collate information from the various States. Reasons for variations in quality will be assessed, to provide information on which to improve the marketing of Australian grain overseas.

Graphs and histograms from Chemist's Branch records, to show the variation in quality of wheat from year to year under climatic variations, and detailed information on the milling and baking quality of commonly grown wheats have been prepared. The N.S.W. information was subsequently co-ordinated with information from authorities on other aspects of wheat in this State. A consequent report was submitted to the Commonwealth Government.

Flour Quality Control.—Factors in combination have stimulated the millers' interest in accurate flour quality control. They have sought information on establishment of new laboratories and the extension of existing facilities in flour mills.

The variation in wheat supplied to mills by reason of the relatively high quality of the limited amount of grain from the 1957 crop, compared with the lower quality grain from the previous year, made accurate evaluation necessary for blendings. Moreover, the high price of premium wheat made judicious use more necessary than if the price had been lower. In addition, the almost total elimination of the export flour trade made competition for local trade more keen.

Installation of laboratory equipment at a mill involves a heavy capital outlay, and employment of technical staff adds to cost of production. However, the flour milling industry is mindful of the ultimate benefits from technical control. Advisory work in this field will continue to expand.

Wheat Judging at Shows.—Wheat competitions help the spread of information on wheat quality, and help farmers' understanding of why some types of grain are evaluated more highly than others. Two officers of the Chemist Branch acted as judges and two as stewards in the competitive wheat class of Sydney Royal Show, and an officer acted as judge of wheat at Narrabri Show. General standard of the entries was very high and, notwithstanding the dry season, the number of exhibits increased.



Radioactive Isotopes in Plant Nutrition Research

Chemist Branch is using Radioactive Isotope P-32 to study nutrient uptake and movement in pasture plants. The isotope has been used also to establish whether growth of mosaic virus is associated with phosphorus accumulation in a mosaic affected plant. A paper will be published.

PHYSICAL CHEMISTRY SECTION

Return of Research Staff.—Dr. Redies returned from the N.S.W. University of Technology, where he had been studying radiochemical techniques. Dr. Davey returned from overseas, where he had been carrying out research using spectrographic procedures.

Plans for Improved Facilities.—Plans have been drawn up for new physical laboratories. Plans also for an isotopes laboratory had been drawn up previously. These plans should not require much modification if the ultimate location is Rydalmere.

Radioactive Isotope Work.—Dr. Davey's Ph.D. degree research is being extended, using the radioactive isotope P-32.

Dr. Davey worked in the Department of Spectrography at the Macaulay Institute for Soil Research at Aberdeen, Scotland. He was awarded the degree of Doctor of Philosophy by the University of Aberdeen, for a study of seasonal distribution and variation in the trace and major elements content of pasture herbage species.

The Faculty of Agriculture, University of Sydney, has made glasshouse facilities available. Radioactive isotopes cannot be successfully applied to agricultural research without appropriate working facilities.

Sufficient P-32 was available to undertake two additional, minor investigations. One concerns the uptake of nutrient by Kikuyu grass runners. The other aimed to establish whether the growth of the mosaic virus is associated with an accumulation of phosphorus, and has yielded results. A paper will be published. Meantime, more information is being attempted from autoradiographs.

Acknowledgements are due also to Dr. Green of the N.S.W. University of Technology for laboratory facilities, equipment and his assistance in work with radioactive materials.

SOIL SURVEY UNIT

General.—A laboratory assistant and a field assistant have been appointed as replacements for earlier resignations, but the field assistant is on extended sick leave. The work of the Unit, already impaired by staff shortages, has thus been further handicapped.

Dr. Davey and Dr. Storrier returned from overseas in August, 1957, and May, 1958, respectively. Both were studying under Thomas Lawrence Pawlett scholarships awarded by the University of Sydney.

Dr. Storrier worked at Rothamsted Experimental Station in Harpenden, Hertfordshire. He received the degree of Doctor of Philosophy from the University of London, for a study of the weathering of soils developed from highly ferruginous parent materials.

Soil Surveys.—The Unit carried out several soil surveys, most of them at the request of government organisations. Some of the surveys were as follows:—

Bellinger River District Survey.—A survey of 200 square miles in the Bellinger River district was commenced. About 60 per cent. of the area is rugged mountainous country, and includes three State Forests; the remainder comprises dairying and grazing land, with valuable river flats.

In the mountainous area there are shallower clay loams, developed from phyllite rock; and on the upland hill slopes there are moderately deep yellow-brown clay loam soils, formed under the influence of high rainfall and temperature. These soils are acid, heavily leached and of low natural fertility.

On the gentler slopes, near the coast, soils have well developed profiles. They are of an older era than the upland soils.

Terrace soils have been divided into (a) the *High Terrace*, mainly upstream from Bellingen township; the soils well-structured reddish brown clay loam, deeply weathered and probably basaltic in origin; and (b) the *Recent Terraces* where the soils are grey-brown clay loams, relatively fertile and showing little profile development.

Clarence Valley Survey.—Requested by Division of Plant Industry a rapid reconnaissance-type survey of the major soil groups of the Clarence Valley was carried out. A field trial site was checked for suitability of soil type and a series of soil samples was collected for investigation by the Plant Nutrition Section.

Menindee Survey.—Requested by the Water Conservation and Irrigation Commission, several areas totalling 5,000 acres in the vicinity of Menindee were surveyed in detail, to determine the suitability of the land for irrigation. A map and report are being prepared.

Wee Waa Survey.—A detailed reconnaissance survey of an additional 40,000 acres, adjacent to the area surveyed in 1956-57 for irrigation developments from Keepit Dam, was carried out. A map has been prepared.

M.I.A. Survey.—Some 5,000 acres of hill and slope country on the edge of the M.I.A. were surveyed in detail, to permit selection of a number of horticultural farms for re-establishment of farmers seriously affected by death of fruit trees in the wet 1956 winter.

Soil Investigations.—Several soil research projects are in hand. They include the following:—

Salting Problem, Hawkesbury River Flats.—Investigation of the salting problem of the Hawkesbury River flats continued. The salted areas have been mapped and representative soil samples from the affected areas have been analysed. Depth of the salted water table and fluctuations in the level have been measured.

The pattern of the salted areas reflects the presence of temporary lagoons which fill by river flooding and subsequently slowly dry out, suggesting that the salting results from concentration by evaporation. The higher salt content in the immediate surveys supports this hypothesis, but evaporation of a rising salty water table could also be responsible.

Drainage, soil correctives, and good irrigation practice, could correct saltiness of these soils if subsoil drainage was satisfactory. This aspect has yet to be investigated.

Bellingen Soil Fertility Investigation.—Soil fertility investigations in the Bellingen River district were commenced, using the soil survey information (see earlier paragraph) as a basis.

Plot trials laid down by the Plant Nutrition Unit had indicated that the soils were very deficient in phosphate and, because of low economic status of farmers in the area, the possibility of devising a suitable Soil Advisory Service for them is in hand. Such service would help the economic recovery of the area.

A comprehensive soil sampling programme was undertaken and, based on chemical analyses, six trials were laid down. These are on a range of soil types and involve the use of various quantities of superphosphate on Kikuyu and clover pastures.

Available phosphate in the soils is being determined by a number of the recognised techniques. It is hoped that a method which will give the best correlation with pasture response will be found, for use in subsequent advisory work.

The nitrogen (nitrate and ammonia nitrogen) status of these soils is under investigation, to determine the soil's ability to supply sufficient nitrogen for satisfactory plant growth.

Influence of Soil Temperature and Moisture on Availability of Nutrients.—A study of the influence of soil temperatures and moisture on the recovery of added phosphate is being pursued in collaboration with the University of Sydney and the New South Wales University of Technology. It is designed with particular reference to drought effects. The results may have particular reference to the problems of soil fertility in glasshouses. Radioactive phosphorus is being used, for differentiation of added fertiliser phosphorus from the active phosphorus in the soil.

Effects of Band and Broadcast Placement on Phosphorus Nutrition of Kikuyu Grass.—Use of Kikuyu, one of six species in the Bellingen fertility investigation, raises the problem of phosphorus transport from plot to plot in the runners. Radioactive phosphorus is being used to determine the amount of phosphorus transported in the Kikuyu runners under several conditions.

Physiology of Tobacco Mosaic Virus.—A further experiment in collaboration with the University of Sydney and the New South Wales University of Technology is being carried out to determine whether nucleoproteins are accumulative at the centre of virus infection. Preliminary experiments with radioactive isotope P-32 indicate that an accumulation does occur. Further work, involving micro-autoradiographs, is in hand to follow the effect to a further stage.

PLANT NUTRITION SECTION

Methods Developments.—Improved methods for determining biuret in urea, and phosphorus in plant matter have been under examination.

Biuret in Urea.—Increased use of urea as a fertiliser has spotlighted the importance of its biuret content. There have been many complaints of damage by excess biuret. Published methods for determining biuret have been examined and the most suitable for routine determinations of biuret in the laboratory has been selected. It has proved very reliable in surveying and checking biuret content of commercial urea samples.

Phosphorus in Plant Matter.—Demands for phosphate determinations in plant matter are increasing. Further modifications of the present technique for routine phosphorus determinations in plant matter have resulted in considerable saving in time.

Salt Toxicity Analyses.—Salt excess is still the main toxicity factor coming to the notice of the Chemist Branch. Salt toxicity is encountered in the Irrigation Areas and the symptoms are not always prominent. Field officers continue to seek the analysts' help, particularly in respect of fruit and vegetable crops, before proceeding with diagnosis of affected plants and advisory assistance to fruit and vegetable growers.

Salt toxicity is encountered also in isolated patches elsewhere than in the Irrigation Areas. Toxicity levels have been established in lucerne, prunes, vines, spotted gums, citrus, tomatoes, and beans, from various centres. Salt toxicity is likely in almost any region where the water table is near the surface.

Spectrographic Analyses for Calcium, Manganese, Magnesium and Sodium.—The spectrograph is used for diagnosing deficiencies or toxicities in pasture and crop plants. Determinations of calcium, manganese, magnesium and sodium are now routine. Many valuable leads or guides to recommendations have been obtained by analysing plants for these elements.

Where it is desired to carry out potash determinations alone, considerable time is saved by using the Eel Flame Photometer.

The Spectrograph, however, is a most important tool for the diagnosis of the above mineral deficiencies in plants. The following are examples of the diagnostic work:—

Magnesium and Potassium.—Magnesium deficiency has been diagnosed as the cause of chlorosis in tomato leaves grown in glasshouses and as the cause of malnutrition in cauliflowers. Potassium deficiency has been diagnosed in apples, cauliflowers, clovers and grapes from various centres in New South Wales.

Manganese.—Manganese toxicity is likely to occur in plants grown under acid conditions. It was recorded in many areas years ago, and isolated examples are continually revealed by analyses, particularly where heavy rates of ammonium sulphate have been used. Correction by liming is the recommendation.

Boron.—This is one of the most important trace elements in N.S.W., in crops other than pasture plants. Boron deficiencies and toxicities have been recorded in a wide range of plants, including apples, pears, and cauliflowers. An interesting double deficiency of boron and potash has been established in cauliflowers grown near Cowra.

Of interest, boron toxicity symptoms in citrus are very similar to the symptoms known as "yellow tip" caused by a biuret toxicity. In such circumstances analyses of the plant matter are particularly important.

Grape Nutrition Survey.—A survey of the leaves from grape vines in a number of areas has been completed. The data from this survey are proving to be valuable references in diagnosing mineral deficiencies.

Maize Nutrition.—At Box Hill, near to the metropolitan area, some interesting nitrogen/phosphate studies, and at Taree, on the lower north coast, Molybdenum studies have been conducted,

Nitrogen/Phosphate Studies at Box Hill.—It was previously established in the Mt. Druitt area and also in pot trials that nitrogen and phosphate, as well as irrigation, are limiting maize yields in the near metropolitan area.

In the Box Hill locality, rates of nitrogen and phosphate and the effect of irrigation on maize have been studied in more detail. It was found that best fertiliser results are obtained when both ammonium sulphate and superphosphate are used, in approximately equal quantities. Where ammonium sulphate is used in the absence of superphosphate, dry matter yields are not much better than when no fertiliser is used. The importance of a balanced nitrogen/phosphate fertiliser was established. With low (2 in.) strategic irrigations spectacular yield responses occurred.

Samples were collected throughout the growing season for quick test and total nutrient determinations. Chemical data were related to colour, symptoms, final yields, and fertiliser applications. There was good correlation between fertiliser applications, colour of the plant, and the nitrate status of leaves as determined by quick tests.

Molybdenum Studies in Maize.—Molybdenum deficiency in maize was first reported by the Taree district agronomist. Studies have been carried out by the Chemist Branch. Most commercial maize hybrids have been studied in relation to their molybdenum content. It appears that certain hybrids are more prone to show symptoms in early seedling stages.

A survey which commenced in the Taree district has now been extended to cover the sensitive varieties State-wide. Molybdenum determinations and pot studies of grain from all available sources throughout the State are proceeding.

Phosphate Levels in Pastures.—Many analyses of phosphate levels have been made.

Samples of clovers have been taken from plots treated at various levels of phosphate. Generally, there is a tendency for the phosphate levels to increase in the clover leaves with increasing phosphate applications. The phosphate levels in the leaves at first increase rapidly, and then the rate of increase declines. Samples have been analysed from field trails at Campbelltown, Berry, Wyong, Bellingen and Tia; and similar glasshouse studies have been carried out on soils from Capertee, Bellingen, Grafton, Rylstone and other centres.

Once the phosphate content of the clover leaves from plants growing normally reaches a critical level, about 0.25 per cent., the increase in dry matter yields is not substantial. It would seem that where the leaves of clovers contain 0.25 per cent. P it would be uneconomic to use further phosphatic fertiliser.

Since phosphate is the most important fertiliser in this country, further data on phosphate levels in the leaves of different types and varieties of legumes will be accumulated. This will help in advising farmers on phosphate use.

Molybdenum in Pastures.—Recent work on molybdenum throws doubt on the original molybdenum advice that one application would last for ten years. There is strong evidence that where applications were made on a red basaltic soil three years ago, the molybdenum content in the growing clover plants is now running out.

Sulphur in Pastures.—Farmers are constantly inquiring as to use of sulphur in place of a phosphorus and sulphur fertiliser. There is now evidence that no blanket recommendation can be made.

The phosphorus and sulphur replacability experiment at Walcha is at a very interesting stage. Sulphur deficiency is not apparent on the soil type at Walcha until a certain amount of phosphate has been applied. Unless sulphur is applied at this stage, added phosphate does not increase the dry matter yields. Even so, once sulphur applications have been made their effect may not last for more than a year.

These field experiments are being supplemented by studies of phosphorus and sulphur levels in the leaves of plants. Glasshouse studies on phosphorus and sulphur are also being carried out on soils from Tia and Capertee. The residual effect of phosphorus and sulphur applications are being studied closely.

Nitrogen Determinations—I.C.I.A.N.Z. Fund.—Following a grant by I.C.I.A.N.Z., projects were set up to establish the effect of nitrogenous fertiliser on pastures. In 1957-58 approximately 4,000 protein determinations have been made on pastures from Berry, Grafton, Condobolin, Hawkesbury, Wollongbar, Tumut, Cowra, and other centres. The Plant Nutrition Unit is now giving a *protein determinations service* to research and extension workers in the Department of Agriculture.

Urea Trials, Tumut Pastures.—Urea applications were made to pastures in Tumut trial area. Data have been accumulated on the dry weight yields, stocking capacity, and pasture and nitrogen recoveries on large areas of treated and untreated land. This exploratory project was undertaken co-operatively with the Division of Plant Industry. The economy of a nitrogen fertiliser will, of course, depend ultimately on the response or increase in animal production. Part of the question is that of whether nitrogen application to pastures will disturb the botanical composition to the extent that the clover component is eliminated or seriously reduced.

Skeleton Weed Response to Fertilisers.—A co-operative study of the variation of nitrogen content in Skeleton Weed has been initiated in the Cowra district. Skeleton Weed is serious in the wheatfields of the south-west, but nevertheless a component of the pastures. The aim of the project is to assess its food value during different growth phases.

The Skeleton Weed has been treated with a number of fertilisers and their effect has been studied in relation to protein content of the weed at various growth stages.

Generally, Skeleton Weed is fairly high in protein during its early growth, but the protein content becomes lower and fibre and woodiness increase as the plant approaches maturity. Leafiness is reduced as the plant ages.

Nutrient Levels in Crops and Pastures.—Before chemical analysis is of assistance to growers and extension officers, fundamental information on the levels and variations of nutrients in different crops is needed. For this it is often necessary to sample crops in a uniform fashion monthly, over a growing season, to find out the upper and lower levels in these nutrients, and the trend of the nutrients during the growing season.

Projects of this type have been initiated within the Chemist's Branch and on a co-operative basis with the C.S.I.R.O. Their importance is increasingly apparent.

Nutrient Status of Apples—Survey.—Leaves from six apple orchards in the Orange district have been sampled monthly; and nitrogen, phosphorus and potash determinations have been made. This project is in co-operation with the C.S.I.R.O. and the Division of Horticulture.

Differences in the nutrient content of the above elements between orchards have been found. Also, phosphate and potash levels in the fruit fall markedly over the growing season.

Where nitrogenous fertilisers have previously been used to advantage in the orchard the fall-off in nitrogen level of the leaves over the growing season is not as dramatic as in the case of potassium and phosphate.

In this project the keeping quality of the apples is also being examined, in relation to nitrogen content of the leaves. There is evidence that heavy nitrogenous fertilisers reduce keeping quality of the fruit.

The table of results showing nitrogen, phosphorus and potash levels is already a useful background for the assessment of mineral nutrient status when these elements are determined on a routine basis from various apple orchards in N.S.W.

Because of the value of this approach it has been decided to carry out determinations of the other nutrients, including calcium, magnesium, boron, manganese, copper, zinc, and possibly molybdenum.

A similar survey of apple orchards in the Wedderburn district has been initiated. It is proposed to compare the nutrient levels in leaves taken from trees respectively growing under conditions of good fertility and low fertility. This type of survey will be extended later to the other apple growing areas, taking in the northern tablelands, the Goulburn district, and the Batlow area.

Orange Quality—Fertiliser Effects.—In co-operation with the C.S.I.R.O. the quality of oranges as affected by fertilisers is under research in the Griffith area.

The C.S.I.R.O. has established that high dressings of ammonium sulphate deleteriously affect the quality of oranges and also phosphate uptake.

Large-scale trials have been established on farmers' properties in the Griffith area to examine further the effect of fertiliser treatments on the uptake of phosphate in citrus trees. Nitrogen and phosphate determinations are being made on the leaves.

By means of the fertiliser trials and analyses, ways and means may be devised to raise and maintain the phosphate uptake levels in citrus and improve the quality of M.I.A. citrus which, in particular, is causing concern.

Extension Service re Plant Nutrition.—The Plant Nutrition Unit has been very active also in extension work. Lectures have been given at a number of Agricultural Bureau conventions and field days, at Hawkesbury Agricultural College, Coonabarabran, Mullaly, Nea, Narrabri, Oakdale, Bellingen, Grafton, and Muswellbrook, and at the district agronomists' conference.

WATERS SECTION

Demeralisation of Saline Water.—Samples of water said to be the desalinated end product of a solar vacuum distillation plant constructed by a Sydney engineer were examined. Suitability of the plant under Australian conditions was not supported by examination. Appropriate advice was communicated to field officers.

A Symposium held at Washington, D.C., U.S.A., in November, 1957, attended by world authorities on the Desalinisation of Sea Water (Saline Waters) examined many methods, including systems similar to the aforementioned. A report, by a C.S.I.R.O. observer, on the symposium, has justified the guarded attitude of the Chemist Branch. The matter of desalinisation of saline waters is being carefully watched by the Branch. Any worthwhile information received will be communicated.

General Water Analyses.—The demand on the water analysis service reached a record level. No less than 1,638 samples of water were analysed, and written advice as to their suitability for stock, irrigation, and domestic use, was given. In addition, numerous enquiries in connection with problems of purification, etc., were received and dealt with.

Despite the phenomenal demand on the water analysis service the back log had been overcome completely by the 30th June, 1958, and the Branch was able to offer a limited "While-You-Wait" service to enquirers bringing samples to the laboratory. This service has been greatly appreciated by country visitors in Sydney only for a few days.

New Methods of Water Analysis.—Methods based on the concept that the electrical conductivity of a water could be used in assessing its salinity and suitability for stock and irrigation have been adopted. Together with titration techniques to determine alkali status and level of calcium and magnesium salts in the water, the conductivity readings allow of a more rapid assessment of the value of the water for pastoral use.

These techniques have been to a large degree the reason why the back log of analyses has been overcome.

New laboratory apparatus has been ordered for early delivery. This will allow conductivity and other measurements to be made in the field from time to time.

"Salinity Meter" for Field Use, being developed.—Steps have been taken also to produce a "Salinity Meter" for field use by agronomists, field officers, orchardists, farmers, etc. A manufacturer of electrical meters has been supplied with data, and samples of standard waters, to further the possibility.

Crops, Salt Tolerance Lists.—Lists showing the relative salt tolerance of crops were abstracted from an accepted American publication, and roneoed and forwarded to field officers. These lists are based on "conductivity" measurements and are therefore in keeping with the new analytical procedures.

Form for "Report of Water Analysis".—This has been changed. The new form reduces office typing to a minimum yet allows a much expanded comment as to the suitability of the water.

Warrell Creek Salinity Problem.—The Warrell Creek low level barrage at Macksville was visited, and preliminary arrangements were made re sampling and testing. This is with a view to alleviating the salinity risk to crops at times of low flow of the creek.

Fluorine Analyses.—All samples of water submitted by the Water Conservation and Irrigation Commission have been analysed for fluorine content. The backlog reported in the 1956-57 Report has been overcome.

Fluorine Survey of Underground Waters.—Mapping of the fluorine content of underground waters in N.S.W. is progressing.

PESTICIDES SECTION

Extension Work re New Pesticides.—Advice has been given on many occasions to farmers and other interested people, concerning the properties and uses of the many new pesticides on the market. Recommendations have been made regarding compatibility in mixtures.

Regulatory Work.—To ensure that manufacturers' pesticide specifications are maintained, analyses are conducted under the Pest Destroyers Act and Stock Foods and Medicines Act. From time to time, complaints have been received from dissatisfied users of these pesticides. These have been investigated. Where justified, legal action may be taken against a manufacturer.

Pesticides Standards.—The Chemist Branch continued to be represented in the Australian Standards Association committee set up to prepare specifications and methods of analysis of insecticides, fungicides and weedkillers. Specifications for DDT, cyanide compounds, and dieldrin have been established during the year.

Spray Residues on Fruit.—Most countries have already established or are in the process of preparing strict legislation to control the hazard from toxic residues on food after agricultural spray applications.

The implications are fully appreciated by the Commonwealth Government, since sprayed fruit is regularly marketed overseas. A monetary grant has been made to the Chemist Branch by the Commonwealth Department of Primary Industry to facilitate investigations into the incidence and removal of pesticide residues.

Preliminary surveys of the incidence of residues of various commonly-used pesticides are proceeding, and some work on removal of lead arsenate, D.D.T. and T.M.T.D. residues, using various acid, alkali, and detergent treatments, has been completed. Further spray removal work has been planned. A machine for washing the fruit is on order.

Pesticides Analytical Methods Research.—Research into development of new methods for analysis of pesticides continued, with special regard for micro-methods of determining spray residues.

Cattle Tick Dip Investigations.—Investigations of formulations for dipping cattle for control of cattle tick (*Boophilus microplus*) continued. The investigations have been concerned mainly with chlorinated hydrocarbon acaricides and the effects of surface active agents upon them.

Using engorged bush ticks (*Haemaphysalis bispinosa*) collected from naturally infested cattle, the biological effects of added surface-active agents upon the deposition of BHC, in the form of a dispersible powder, were demonstrated. *Haemaphysalis* ticks were used because the investigations were conducted outside the quarantine areas for *B. microplus*.

The solubility of the BHC in the added surface-active agent had a marked effect upon the efficiency of the formulation. One surface-active agent of higher solubility for BHC partly detoxified the formulation, whereas another agent, of relatively low solubility for BHC, had little effect.

Further work with ticks is planned for the 1958 summer. Meanwhile, during the off season for ticks, the investigations on formulations are being continued, using the flour beetle (*Tribolium*) as a biological indicator.

Analysis of Hair Deposits in Dips.—Using a direct absorption method in the ultra violet region, hair samples from cattle dipped in DDT formulations have been analysed for deposited DDT. These samples have come from dipping trials by the Board of Tick Control, in the tick quarantine areas in the far north coast region of N.S.W.

DAIRY CHEMISTRY

Butter.—Owing to outstanding demand for water analyses, this year the examination of butters for the Royal Agricultural Show and the Dairy Factory Managers' Conference could not be undertaken.

Miscellaneous Dairy Factory Analyses.—Analytical work was carried out for Division of Dairying throughout the year; comprising examination of and report on samples as follows:—

Casein.—Manufactured by Peters Creameries Ltd., Taree; inaugural processing.

Coffee Extract.—Manufactured by the Hunter Valley Co-op. Dairy Co.; caffeine determinations.

Milk Powder.—Manufactured by Manning River Co-op. Dairy Co., Taree; salt contamination.

Cheese Spread.—Moisture—fat determinations re conformity to Dairy Act.

Casein.—Moisture determination apparatus; comparison of Infra Red Meter and Vacuum Oven techniques.

MISCELLANEOUS ANALYSES

Meat Meal Analyses.—For the Abattoirs Officer, meat meals from inaugural runs of Gunnedah Abattoir plant were examined.

Potato Analyses.—Examination of sweated potatoes for relative sugar content were undertaken at the request of the Chief Biologist.

Linseed Oil Extraction Methods.—Important work recently completed on the Chemist's Branch Test Milling Plant by Messrs. L. Jones and G. Almgren should have an effect on the commercial extraction of oil from this seed.

Pressure expelling of the oil has been superseded by the use of solvents; but this method also has its limitations, as generally at least 10 per cent. of the oil is not extracted. The price obtained for the oil is ten times that of the price obtained for the meal residue. Therefore it is important that extraction should be as efficient as possible.

Recent work in the U.S.A. has shown that particle shape and size of the meal to be treated are most important factors in the process. At the request of a Sydney linseed oil firm, samples of linseed were reduced by varying techniques in the Chemist Branch to different degrees of fineness. These will enable the firm to carry out research on particle shape and size.

YANCO CHEMIST'S RESEARCH LABORATORY

Construction.—Considerable progress has been made in the construction of the Yanco Research Laboratory. This laboratory will concentrate initially on rice and fruit quality problems in the M.I.A. Major financial contributions by the rice industry have been important in establishing this urgently needed laboratory.

Due to initial lack of sufficient funds, construction of the Laboratory has had to be carried out in three stages:—

Stage I: Construction of Fume Room, Store Room (in part), Soil Preparation Room and Balance Room.

Stage II: Rice Laboratory and Rice Milling and Testing Rooms.

Stage III: Fruit Quality Laboratory, Plant Preparation Room, and completion of sundry requirements in Stages I and II.

Stage II is near to completion. Stage III will also be completed in the near future. Later, consideration will be given to:—

Stage IV: Construction of a Spectrographic Room, with provisions for Preparation and Dark Room annexes.

Staff.—Initial provision has been made for appointment of a rice chemist and assistant, and a fruit quality chemist and assistant.

CONFERENCES AND COMMITTEES

The following major conferences were attended by officers of the Branch:—

Conference of Cereal Chemists at Tamworth.

Australian Conference in Soil Science in Melbourne.

Coastal Pasture Research Committee.

The Chief Chemist and/or officers acted also in the following committees:—

Soil Survey Advisory Committee.

Plant Nutrition Committee.

Pest Destroyers Act Committee.

Civil Defence Food and Agriculture Research Committee.

Advisory Committee, Agricultural Research Institute, Wagga Wagga.

Veterinary Medicines Act Committee.

Standing Advisory Committee on Wheat.

Botanist Branch

BOTANIC GARDENS, NATIONAL HERBARIUM AND ALLIED ACTIVITIES

The main areas were maintained in satisfactory condition relative to staff numbers and adverse weather.

Botanical activities, comprising maintenance of the National Herbarium and research work, proceeded satisfactorily.

A large portrait in oils of Dr. Darnell-Smith, one-time Director of the Botanic Gardens, was presented to the Herbarium by Mr. Herman Slade, a nephew of the artist, Miss Mary Slade. The portrait has been hung in the vestibule of the Herbarium.

A collection of water-colour paintings of native and cultivated plants was presented to the Herbarium by Mrs. Bennet of Balgowlah. The paintings were executed over a number of years by Mrs. Bennet's mother, Mrs. McReddie, M.B.E.

Following the disastrous fire at the University of New England, when practically the whole of the contents of the School of Botany was lost, a large number of duplicate reference books and periodicals and reprints of technical papers was forwarded to assist in replacing part of the library. Duplicate herbarium specimens of representative families were forwarded, and a quantity of botanical material was provided for student study.

NATIONAL HERBARIUM

The herbarium collection was satisfactorily maintained, and valuable work was completed.

Plant Species New to New South Wales.—The following plant species were recorded at the locality as respectively listed. The country of origin and/or previously known distribution in Australia is/are indicated in parenthesis:—

Acacia sp. with affinities to *A. oxycedrus*; at Hat Head, north coast; (appears to be an undescribed species).

Acanthospermum hispidum, "Star Burr"; Tenterfield district; (Brazil; naturalised in Queensland).

Carexolophocarpa; Woodenbong; (southern Queensland).

Chrysophyllum chartaceum; Brunswick River; (Queensland).

Cryptocarya moretoniana; far north coast; (Queensland).

Echinochloa sp., probably *E. oplismenoides*, a central Mexican species; found in a rice crop at Deniliquin.

Endiandra compressa; below Minyon Falls, Lismore district; (Queensland, where it is known as "White-bark").

Fimbristylis bisumbellata; Upper Richmond River; (tropics).

Lepidosperma gladiatum; Pambula; (southern states of Australia).

Lepidosperma limocola; coast and tablelands; recently described from Victoria; (species has been formerly confused with several other species).

Lophospermum erubescens; Coff's Harbour district; (Mexico).

Parsonia sp. with affinities to *P. ventricosa*; Coff's Harbour district; (appears to be an undescribed species).

Planchonella chartacea, Byron Bay-Tweed River district; (Queensland).

Scirpus victoriensis; South-west Slopes; (Victoria).

Setaria brownii; Walgett district; (Central Australia, Northern Territory and Queensland).

Records of Rare Species.—The following rarely collected species were identified:—

Acrophyllum venosum, at Woodford. This small shrub of the family Cunoniaceae is confined to a few moist gullies in the Linden-Woodford area of the Blue Mountains.

Corybas diemenicus, at Slaty Hill, 16 miles south of Orange; recorded on only two previous occasions, though the species is well represented in Victoria, South Australia and Tasmania.

Hibbertia hexandra, from the Kippara State Forest, Wauchope district; second record of this Southern Queensland species.

Kunzea rupestris, from the Maroota-Glenorie Road area; second record.

Lepiderema punctulata, on Stott's Island in the Tweed River. In over fifty years this was only the second record of this small, rainforest tree of the family Sapindaceae.

Pandorea baileyana, on the Brunswick River. This large-flowered native climber of the Bignoniaceae has been collected only twice previously.

Extensions of Range.—Field observations showed that the respective known range of species listed below were extended as indicated:—

Acacia amoena, in the Armidale district; not previously known north of the Hawkesbury River.

Angophora subvelutina, "Broad-leaved Apple", at Gilgai, near Inverell; a first record for the Western Slopes.

Banksia marginata, Gibraltar Range, east of Glen Innes; though widespread, not previously known from the Northern Tablelands.

Bulbophyllum minutissimum, from Milton; a further southward extension; recorded at Kiama only in 1956, for the first time south of Port Jackson.

Casuarina equisetifolia var. *incana*, at Laurieton, Camden Haven; an extension southwards from Port Macquarie.

Caustis recurvata, east of Rylstone at 2,500 feet elevation; previously known only near the coast.

Conospermum longifolium, at Gibraltar Range, east of Glen Innes; an extension northwards from the Hunter River.

Cyperus subulatus, near Bourke; first record for an inland locality; known formerly only from the far North Coast and Queensland.

Drosera pygmaea, at Lennox Head; not previously known north of Sydney.

Eucalyptus dives, "Broad-leaved Peppermint", on a belt of poor stony country about 10 miles in length in the Niargala-Glen Morrison area, south of Walcha; a northward extension from the Rylstone district.

Eucalyptus mckieana, Gilgai, near Inverell; being the first record away from the Moredun Creek area.

Eucalyptus paniculata, "Grey Ironbark", at Bril Bril State Forest near Wauchope; a northward extension from the Manning River.

Exocarpus strictus, at Moredun Creek; the first record from the western side of the Northern Tableland.

Oberonia titania, near Kendall, Manning River district; a southern extension from the Clarence River.

Persoonia rigida, at Mt. Kembla; the first coastal record of this species which is widespread on the Western Slopes and Southern Tablelands.

Persoonia virgata, at Laurieton, Camden Haven; previously known only north of the Macleay River.

Velleia montana, from Happy Jacks Plain, Snowy Mountains area; formerly known in New South Wales from the Blue Mountains, but been recorded also in the Victorian Alps and Tasmania.

Xanthorrhoea arborea, in the Minyon Falls area; not previously known north of the Gosford district.

Exchanges with other Institutions.—A notable feature of the system of exchange of herbarium specimens for the current year was the large total sent overseas, comprising 3,548 sheets forwarded to 26 institutions. They included material requested for study at various institutions by specialist workers.

In exchange the New South Wales National Herbarium received 1,234 sheets of ferns and seed plants, from 13 institutions overseas, and a large collection of mosses and liverworts from Japan.

Loans of herbarium specimens were made to the University of Tasmania; the State Herbarium, Adelaide; the Botanic Garden, Singapore, and elsewhere. Material received on loan included a large collection of *Diuris* spp. from Bogor, Indonesia.

Field Collections and Seed Exchange.—The Seed and Plant Collector undertook seven major collecting trips, ranging from four to fourteen days' duration, in the following areas: Howes Valley and Widdin district; Central Tilba-Nowra-Pigeon House Range-Nerriga; Bathurst-Molong-Dripstone; Wyong-Olney-Narara; Bathurst-Abercrombie Caves-Wyagdon; Canberra-Brindabella-Rules Point-Kosciusko; Coff's Harbour-Kempsey-Carrai-Armidale. He travelled 5,059 miles, in the 61 days concerned. In addition, he made 14 one-day trips to selected sites around Sydney and on the Blue Mountains.

Just over 500 numbers were collected as bulk herbarium material for overseas exchange, and 350 collections of seed were made for the same purpose. Collecting, in general, remains specific, many of the species being sought by specialist research workers.

In response to requests, 230 samples of seed of native and exotic species were forwarded to 22 overseas and 3 Australian institutions. In exchange 234 samples of seeds of trees, shrubs and herbaceous species were received, upon request, from 30 institutions in Europe, Asia, Africa and America, and from 3 Australian sources.

Field Investigations.—A feature of the year was the number of field trips made by members of the botanical staff.

The *Poa caespitosa* complex was investigated on the South Coast, the Australian Alps, the Blue Mountains, the North Coast and Tablelands, and the Snowy Mountains. Strains of *Sorghum aluum* and associated species were investigated at the Grafton Experiment Farm. *Wahlenbergia*, *Ranunculus* and *Oreomyrrhus* species were collected in Snowy Mountains field work. Dr. Beard of Natal was conducted on a collecting trip to Kurrajong Heights and Colo in connection with the *Acacia mollissima* group. One of the staff spent three weeks in the Northern Territory where species of *Eucalyptus* and members of the Chenopodiaceae were studied, apart from general collecting.

Research.—The first part of the projected publication "The Flora of New South Wales" has been submitted for printing. This contains a general introduction to the work, analytical keys to the families of Gymnosperms and Monocotyledons, and descriptive matter covering 18 families of Gymnosperms and Monocotyledons.

A second contribution to the "Flora of New South Wales" has been almost completed. This consists of descriptive matter covering approximately half of the large family Papilionaceae, together with an analytical key to all the genera of the family present in New South Wales.

Material for the "Flora" has also been prepared on two further genera of the Papilionaceae, viz. *Bossiaea*, (with 17 species in New South Wales) and *Platylobium* (with 1 species in New South Wales).

Preparation of material covering the Pteridophyta has been continued.

A paper on the family Zamiaceae (Cycads) is in preparation to supplement the material prepared for inclusion in the "Flora".

Further work has been done on the fern genus *Lastreopsis*. A monograph on it is nearing completion and will cover all the known species.

The section on Pteridophyta in preparation for the handbook to be published by the Botany Department, University of Sydney, on the flora of the County of Cumberland and nearby districts, is nearing completion.

Other Pteridophytes critically examined included species of *Mecodium*, *Marsilea*, *Vittaria*, *Gleichenia*, *Cyathea* and *Dicksonia*.

Work continued on the *Acacia decurrens* group of wattles. These are important tanning bark trees in which the Wattle Research Institute and commercial firms in South Africa are very interested. Their representatives were assisted in field studies. Collections made during their travels added useful data on distribution of certain species.

Several critical species of the genus *Eucalyptus* have been investigated as part of a re-evaluation of the system of subdivision within the genus. This work is now showing the way to a new and more natural classification. The line of research was pursued during a field trip to study the *Eucalyptus* spp. of the Northern Territory.

An investigation of material hitherto regarded as "Buffel Grass" showed that two superficially similar species are present in the State, viz., *Cenchrus ciliaris* and *C. pennisetiformis*.

Investigation of the herbarium collections showed that the common "Sorrel" or "Sheep Sorrel", a widespread weed in New South Wales, is not the true *Rumex acetosella*, as formerly thought. It is a distinct species, native of Southern Europe and naturalised also in North and South America and South Africa. Its correct name will depend on the concept of the genus *Rumex*. There are good grounds for segregating the plants as the genus *Acetosella*.

Material in the herbarium has shown that the common *Capparis* of the North Coast rainforests is not identical with the Norfolk Island species *C. nobilis*, as formerly held, but with *C. canescens*, described from North Queensland.

Field work on the North Coast and re-examination of herbarium material indicate that the large rainforest tree *Daphnandra tenuipes* is quite distinct from the more widespread *D. micrantha*.

On the other hand, the small rainforest tree or shrub *Actephila mooreana* has been found to be merely a form of *A. grandifolia*.

Herbarium material of the family Gyrostemonaceae has been studied and re-determined. This small family is one of the few wholly confined to Australia. There has been considerable confusion in respect of the species of the genera *Gyrostemon* and *Didymotheca*.

Following research in the U.S.A., the correct botanical name of the "Common Devil's-claw", a weed on the western slopes of New South Wales, has been determined as *Proboscidea louisianica*, not "*P. jussieu*", as it has been called here and abroad.

Recent work overseas has corrected the name for *Osteospermum moniliferum*, "Boneseed", a native of South Africa naturalised in coastal districts, to *Chrysanthemoides monilifera*.

Herbarium collections of the genus *Lupinus* have been sorted, with particular attention to identification of the species naturalised in this country. It was found that most of the naturalised lupins, usually found in sandy coastal country, are Mediterranean species; whereas most of the horticultural lupins grown here are of American origin.

Revision of the genus *Poa* continued, and further field works were carried out on the New England Tableland and Snowy Mountains. Type specimens of most of the described species have been examined, and description of a few of the new species have been drafted.

Herbarium collections of *Carex* have been re-organised and brought up to date, and some new records have been noted.

The collections of *Fimbristylis* species that occur in New South Wales have been similarly studied.

The collections of the families Lauraceae and Monimiaceae and of the genus *Xylomelum* (Proteaceae) have been completely reviewed.

Collections of the genus *Juncus* and of the family Chenopodiaceae, were critically examined at Adelaide and a number of Type specimens there were studied.

In North Coast field work, particular members of the Lauraceae and Monimiaceae, the genus *Ficus*, and certain other groups were given special study.

Professional Visitors to the Herbarium.—Scientific workers from overseas and Australian institutions who visited the Herbarium to study collections and for discussions included: Dr. L. Atkinson, Amherst College, Mass., U.S.A. (fern problems); Dr. J. Beard, Natal, South Africa (*Acacia* spp.); Prof. N. Beadle, and Dr. G. Davis, both of New England University; Mr. G. F. Dennis, Guadalcanal, British Solomon Islands Protectorate (collecting for British Museum of Natural History); Mr. A. Floyd, Coffs Harbour District Forestry Office; Mr. M. Gray, C.S.I.R.O., Canberra; Mr. J. W. Goodwin, Superintendent of Parks and Gardens, New Plymouth, New Zealand; Mr. N. Hall, Commonwealth Forestry and Timber Bureau, Canberra, (dry-country trees and shrubs); Dr. R. D. Hoogland, C.S.I.R.O., Canberra (Cunoniaceae and Escalloniaceae); Dr. Llano, U.S. Navy, and American authority on lichens; Dr. M. E. Phillips, Snowy Mountains Hydro-Electric Authority, Cooma; Mr. L. D. Pryor, Superintendent of Parks and Gardens, Canberra (*Eucalyptus* spp.); Mr. M. A. Shaikh, F.A.O. Fellow, Karachi, Pakistan; Mr. Sherry, Wattle Research Institute, University of Natal, South Africa (*Acacia mollissima* group of tanning-bark wattles); Prof. H. St. John, University of Hawaii (*Pandanus* spp.); Miss M. Tebley, Botanical Society of the British Isles (*Lastreopsis* spp. and other ferns); Professor C. L. Wilson, Dartmouth College, New Hampshire, U.S.A. (*Hibbertia* spp.); Mr. J. Womersley, Forestry Service, Lae, New Guinea.

Lectures and Radio Talks by Herbarium Staff.—Lectures and/or radio talks by the staff included "Methods of Research in Systematics", "Life and Work of Linnaeus", "History of the Botanic Gardens", "Wildflowers", and "Seasons in the Botanic Gardens".

Illustrated talks were also given to Botanic Gardens and Inner Domain staffs.

Determinations on Special Collections.—Apart from general identifications, several special collections have been determined, such as fern collections from New Caledonia, collected by Dr. McKee; grass specimens from the Agricultural School, Sydney University; bulk collections made by Prof. C. Wilson, of Dartmouth College, New Hampshire, U.S.A.; *Acacia* collections made by Dr. Beard and Mr. Sherry, both of South Africa; and *Salix* spp. for the Snowy Mountains Authority.

Identification of Plant Remains in Livestock Rumens.—Rumen contents of fifty-nine sheep, cattle and pigs were investigated for identification of plant remains. Most of the specimens were sent by the Glenfield Veterinary Research Station of the Department.

Service in Various Committees or Trusts.—As in former years, the Chief Botanist and/or members of the botanical staff served in the following committees or trusts: Remembrance Driveway Committee; Technical College Horticultural Advisory Committee; Standing Committee on Trees and Forests of the Men of the Land Society; the Muogamarra Trust; The Council of the Linnean Society; The Royal Horticultural Society; and The Botanic Gardens Trust.

BOTANIC GARDENS

Effect of Water Restrictions.—The drought periods and consequent Water Board ban on watering by hoses threatened damage and loss of many botanically or horticulturally valuable plants. By negotiation the Water Board in due course allowed the Gardens some use of hoses. It permitted their use, in limited number, on selected areas, between 3 and 7 p.m. Some of the staff worked overtime for the purpose. Selected plants were hand-watered in the remaining areas. Some valuable plants were lost or damaged during the dry period, but comparatively few.

Royal Visit.—Special attention was given to Government House grounds and surrounding areas during the visit of Her Majesty the Queen Mother in February, 1958. Special arrangements involving the handling of some 5,000 pot plants were made to counter the effect of water restrictions. In consequence, the grounds were excellent for the Garden Party on February 25th, when thousands of guests attended.

The Queen Mother planted a commemorative tree, *Grievillea robusta* (Silky Oak), in Government House grounds.

Botanic Gardens Improvements.—The lawn-and-flower-bed area immediately to the west of the Herbarium building has been re-designed, to achieve greater harmony with the main building and adjacent areas. Pathways have been altered and a broad grass verge is to be constructed in front of the Herbarium. A new arrangement of flower beds and trees has been adopted.

The stone-and-wood pergola which formerly led to the entrance of the general office was destroyed by a short, violent storm. It has been re-erected along a path leading to the stone-based shelter pavilion in the Garden Palace Grounds.

Shrub and tree species have been planted in large numbers. Many are species not previously grown here.

Feature beds of seventy selections of geraniums *Pelargonium* spp. and *Hypericum*, were established.

Numbers of bush plants were transplanted direct from their native environment to the Native Plants bed near the Herbarium.

Effects of Express Highway.—Following the completion of the Circular Quay Roadway to the Inner Domain area adjacent to the Conservatorium, considerable restoration of adjoining areas became necessary. This included a new boundary fence to the Botanic Gardens, and grading and redesigning of adjacent land. The work was undertaken by the City Council authorities under the direction of the Curator of the Botanic Gardens.

Supply of Plants to Institutions, etc.—Potted plants of tree and shrub species were forwarded to the following institutions: Lower Murray Research Station, Dareton (70); Gosford Citrus Research Station (150); Wagga Agricultural College (62); Wagga High School (64); Randwick Auxiliary Hospital (70); Women's Hospital, Paddington (60); South Head Naval Establishment (24).

A selection of water-lily bulbs was provided for the Teacher's College and Kuringai Chase Trust.

Many of the consignments followed recommendations made by the landscape gardener when working on plans for areas.

Landscape Gardening Service.—The Landscape gardening service was very active for most of the year. Unfortunately, Landscape Gardener Mr. A. Wilson resigned in late March 1958, to take up duties with the Greater Brisbane City Council. Prior to resignation he completed plans and reports for landscaping at the following:

- (a) Country areas: Mercy Hospital, Albury; Graham Park Artificial Breeding Centre, Berry; District Hospital, Gloucester; High School, Kurri Kurri; Nepean District Hospital, Penrith; High School, St. Mary's; High School, Wellington;
- (b) Metropolitan districts: The Australian Museum, City; High School, Carlingford; Champagnat College, Ryde; Child Welfare Department, City (grounds, and indoor plants); Electricity Commission, City; Hurlstone Agricultural High School; Community Centre, Miranda; Nielsen Park, Vacluse; Women's Hospital, Paddington; High School, Parramatta.

Considerable landscape improvement work was carried out also in the Botanic Gardens.

Glasshouse Activities.—Many fine floral displays were provided featuring orchids, schizanthus, chrysanthemum, gloxinia, calceolaria, coleus, cineraria, and foliage displays of caladium, acalypha and crotons.

Plant and floral decorations were arranged for Parliament House and other Departments. Decorations also were maintained at the Royal Agricultural Society's committee rooms and at Departmental exhibits for the Royal Show.

Public Works Department carried out some much-needed repairs to the hot-water system in the glass-houses.

General.—Tours of the Botanic Gardens and Glasshouses by Horticultural Societies and High School classes were conducted.

Garden and playing field problems at Pagewood School, Burwood Transport Depot, and military camps at Liverpool, Holdsworth, Moorebank and Ingleburn were subject of advice.

Spraying programmes were well-maintained during the first six months but the rains of early 1958 hampered these measures. In consequence, heavy infestations of "lace-bugs" *Stephanitis queenslandensis* have developed on Azaleas throughout the Gardens.

Armillaria mellea root-rot continues to take toll of individual trees and shrubs throughout the Gardens.

Heavy silting of the ponds below the creek running through the Botanic Gardens followed torrential rainfalls in mid-March, 1958, when over 11 inches were recorded in the week, with one daily recording of 5 inches.

A selection of wildflowers was forwarded by air to the Adelaide Wildflower Show in October, 1957.

A new tractor-mowing combine has been obtained. It should greatly assist the appearance of the lawns.

THE DOMAINS

The playing areas were again in great demand, particularly during the winter season for football and basket ball. The bowling green constructed last year has been renovated and top-dressed, and is in constant use.

Following the opening of the Circular Quay portion of the Express Highway, Fig Tree Avenue became a one-way traffic thoroughfare. Funds for resurfacing this roadway were provided by the State Government. The work was carried out by the City Council.

Hospital Road also became a one-way thoroughfare.

Parking of cars has become serious, particularly in Mrs. Macquarie's Road, where parking on both sides of the road is a developing habit. It involves traffic hazards but also makes difficult the maintenance of adjoining areas.

The main area in the Domain was used on a number of occasions for ceremonies, including Anzac Day celebrations, and for assembling processions.

CENTENNIAL PARK

The playing areas were again in great demand. An additional area was made available for the flying of model aircraft. Consideration has been given to the establishment of a childrens' playing area near the Oxford Street entrance to the Park. Facilities were made available to the Royal Agricultural Society for contests associated with the Royal Show.

Considerable repairs were affected to bridges and fences. Water services were renewed or extended. Seats were painted. The riding track received special attention.

An unusually large number of dead trees had to be removed.

Construction of the staff change-and-dining room has been undertaken by the Public Works Department.

ADMIRALTY HOUSE.

At the request of His Excellency the Governor-General the Chief Botanist and Curator visited Admiralty House and discussed matters relating to maintenance and improvement of the grounds.

The adjacent grounds of Kirribilli House were taken over by the Gardens staff, and considerable re-designing and planting were carried out.

AGRICULTURAL RESEARCH INSTITUTE, WAGGA WAGGA

Extremely unfavourable growing conditions interfered seriously with the field experimental programme. Cereal improvement work, skeleton weed control studies, subterranean clover sward trials and field fertiliser experiments were all adversely affected.

Laboratory investigational work proceeded satisfactorily and on an expanded scale. Apart from the resignation of the Senior Research Agronomist, the senior staff situation remained stable.

Mr. R. N. Oram, plant breeder and geneticist attached to the C.S.I.R.O., commenced duty early in 1958 following C.S.I.R.O. acceptance of an invitation to locate an officer at this Institute.

Financial Assistance from Wheat Industry Research Fund.—Finance for wheat research became available for the first time from the Wheat Industry Research Fund.

An allocation was received to establish an *Agronomic Survey Unit*, to investigate soil and climatic effects on wheat quality in southern New South Wales. Steps have been taken to recruit personnel for this Unit.

An allocation was received also to purchase a Buhler mill for the Cereal Chemistry section, and to provide a netted enclosure for use by Institute plant breeders stationed at Temora.

Wheat Improvement

Field Testing.—Dry conditions relieved only by moderate rains in June and July, 1957 hampered the 1957-58 programme. All trials were sown but those at Quandialla were subsequently abandoned and at other centres yields were poor.

Useful data were obtained, however, on the relative capacity of varieties and hybrid lines to withstand drought. Fortunately, no otherwise outstanding crossbred material appears to have been eliminated on the score of drought susceptibility.

The bunt resistant crossbred R.D.R. x 4 Insignia performed well under adverse conditions. It topped the trials at Moombooldool and Wallendbeen and was not significantly inferior to the best lines at other centres. On the basis of its performance in this and past seasons this crossbred has been recommended for naming and release.

Transfer of Wheat Breeding Material from Condobolin.—With the transfer in 1957 of the plant breeder stationed at Condobolin it became necessary to locate at another centre the breeding material on hand. Arrangements were made for this material to be taken over by the Temora plant breeder who subsequently arranged for its inclusion in the 1958 sowings.

Breeding for Baking Quality.—The programme of back-crossing for quality was continued, but yields were insufficient for baking tests. It was not possible, therefore, to establish the degree of correlation that exists between baking behaviour and Pelschenke test times, for which purpose the programme was primarily designed.

Except for some of the best crossbred lines, all breeding material subject to excessive starch damage in the milling process (see Annual Report for 1956-57) has been discarded. An attempt by back crossing is being made to remove this undesirable characteristic from those lines retained.

Breeding for Wheat Disease Resistance.—Work on adding disease resistance to standard varieties and promising cross-breeds was continued. Of particular interest is the production of a new strain of the variety Dirk with resistance, derived from various sources, to stem rust, leaf rust, powdery mildew and bunt. Seed stocks of this strain are being increased.

The netted birdproof enclosure at Wagga has proved so useful in enabling effective selection of stem rust resistant lines to be made in summer grown material that a similar enclosure is to be erected at Temora for use by Institute staff located at that centre.

Comparative studies are being made of Australian rust resistant varieties with several lines of Marquis from Canada possessing the Sr 6-Sr 10 genes for resistance.

Wheat Disease Investigations

Laboratory Studies on Survival of Wheat Root Rot Fungi.—The work continued on saprophytic survival of cereal root rot fungi in wheat straw buried in soils of high and low fertility. It was found that whereas survival of *Ophiobolus graminis* and *Fusarium culmorum* were promoted under conditions of high soil fertility, *Helminthosporium sativum* survival was markedly depressed. Survival of *Curvularia ramosa* was little effected by soil fertility status. In terms of actual longevity *F. culmorum*, *H. sativum* and *C. ramosa* each remained viable, under the conditions best suited to their survival, in one-third to one-half of the best straws for 2 years; but *O. graminis* was not recovered after the 52nd week of sampling.

Field Survival Studies.—Survival of those root rot fungi is now being investigated under field conditions at three different levels of soil fertility. Survival data will be recorded at 3 monthly intervals for a period of 18 months from the time the test straw material is incorporated in the soil at each selected site.

Colonization of Cereal and Grass Straw by Root Rot Fungi.—The ability of wheat root rot fungi saprophytically to colonize various types of cereal and grass straw buried in soils of high and low fertility was assessed. *F. culmorum* and *C. ramosa* were found to be very vigorous colonizers of all test material (straw of wheat, oats, barley, Wimmera rye grasses, Phalaris and barley grass). On the other hand, only token colonization was recorded for *O. graminis* and *H. sativum*.

Genetic Studies of Rust Resistance.—The reason for difficulty in transferring stem rust resistance from *Agropyron elongatum* to wheat by backcrossing is under investigation. It appears that resistance is associated with a foreign *Agropyron* chromosome that prevents the establishment of homozygous resistant lines. A current co-operative project with the Division of Plant Industry, C.S.I.R.O. aims at breaking this association by the production of translocations by X-ray irradiation.

Wheat Quality Investigations

Starch Damage in Relation to Flour Quality.—Investigation of the susceptibility of wheat varieties and hybrids to starch grain damage during milling and its relationship to baking quality continued.

The degree of starch damage in individual flour samples from a wide range of wheat varieties was determined on a percentage basis by microscopic examination. Confirmation was obtained that variable water absorption and susceptibility to diastatic attack in the test bake are related to the proportion of damaged starch grains occurring in any given flour sample.

To date, all starch samples have been prepared from normally milled flours so that results obtained could be correlated with baking and milling performance. If a simple grinding technique can be devised to produce in small wheat samples starch damage comparable with that suffered during full scale milling, microscopic examination may well be used to detect and eliminate undesirable types from early crossbred material.

Another approach to a simple small scale method of detecting susceptibility to starch damage is suggested by the observation that "flour release" from wheat samples ground in a laboratory grinder is closely related to ease of remilling and to "toughness". These reliably indicate the amount of starch damage produced by normal milling.

Routine Daily Testing.—A back-log from previous harvests, of grain samples for milling, no longer exists. Wheat breeders' samples from the 1957 harvest were also milled and quality-tested in time to eliminate unsatisfactory quality lines from the 1958 sowings.

Oat Improvement

Grazing and Grain Yield Trials.—Grain yield trials, with and without prior grazing, were again conducted. Yates Algerian performed well in early grazing tests. Fulghum, with its exceptional ability to recover after grazing, was outstanding late in the season. Victorgrain 4 yielded grazing cuts only slightly inferior to Yates Algerian and Fulghum at early and late stages of development, respectively.

Data on extensive grazing trials and yield records based on dry matter weights, grain recovery tests and grain trials without grazing over the past 5 seasons were used in revising the Department's list of oat varieties recommended for sowing in the 1958 season. These data were also used to classify varieties on the basis of their suitability for grain and/or grazing purposes.

Oat Crossing Techniques Improved.—Further improvements have been effected, resulting in seed sets as high as 50 per cent. Consequently, the backcross technique is now being used in some oat crossing programmes.

Plant Physiology

Phasic Development of Cereals.—The appointment of Dr. W. V. Single in January, 1958, enabled the commencement of studies on the phasic development of cereals.

Some current work is seeking critical data on leaf number and dates of ear initiation, jointing, flowering and maturity of a selected series of wheat varieties.

Development, by backcrossing, of winter type strains of the spring wheat variety, Festival, is also receiving attention. Resultant material may furnish valuable data on the relationships between phasic development and wheat yield and quality.

Uptake and distribution of nitrogen by the wheat plant, with particular reference to the influence of this element on floral development, is also under investigation (see also under "Soil Fertility Studies", in the final paragraph concerning the Institute's work).

Pasture Investigations

Subterranean Clover Sward Trials.—Because of poor growth in sward trials sampling was worthwhile only once. At this sampling, the variety Mulwala and an introduced strain (M.26) from Portugal yielded best. All plots set small quantities of seed. Their development following autumn germinations will be followed throughout the current season.

Fifty seed increase plots sown in 1957 set insufficient seed to harvest. Such seed as did set may enable all plots to regenerate satisfactorily this season.

Factors Affecting Soil Population of Viable Subterranean Clover Seed.—Results from germinations of subterranean clover seed present in soil cores taken from the field indicate that the viable seed population in soils varies directly with the age of the pasture. The effect of cultivation methods prior to cropping, on the numbers of viable subterranean clover seed, is also under investigation.

Anomalous Fluorescence in re Subterranean Clover Seed Certification.—Growing-on tests with subterranean clover seed submitted for Departmental certification were conducted. These are to check on an anomalous type of fluorescence observed in laboratory germination tests. The results were in accord with laboratory test data.

This anomalous fluorescence is causing concern in seed certification. A detailed programme of growing-on tests has therefore been designed, to check fully the validity of the fluorescence test for varietal identification.

Interesting Disease Records

Die-back of Lucerne, Fungal origin.—A damping-off and die-back of lucerne in several Riverina districts in 1957 was found to be due primarily to *Pythium debaryanum*, hitherto unrecorded on lucerne in N.S.W.

Flag Smut of Wimmera Ryegrass.—A second interesting record was the occurrence of flag smut on Wimmera ryegrass in the Temora district in November, 1957. Cross inoculation tests to establish the identity of the ryegrass flag smut organism are in progress.

Subterranean Clover "Stunt".—This virus disease, serious in 1955, and again prevalent in 1956, was of little importance under the dry conditions of 1957. Collaborative studies with C.S.I.R.O. Division of Entomology have established that a persistent type virus is responsible, that it is transmitted by aphids and that its host range includes many annual and some perennial legumes.

Weed Investigations

Skeleton Weed, Fallow Spraying Tests.—Fallow spraying tests continued. The method proved less effective under the dry seasonal conditions than the normal programme:—

- Effects on soil nitrate: Soil nitrate content decreased between the time of fallow spraying and sowing. This is attributed to inability of the fallow spray effectively to check skeleton weed development, and to reduced microbiological activity under the prevailing dry conditions.
- Effect on crop growth: Seedling growth on fallow sprayed plots was significantly inferior to that on non-sprayed plots, while nitrogen fertiliser applied with the seed significantly increased growth in both types of plot. Tiller development was not affected by fallow spraying, but early application of nitrogen increased tiller numbers.
- Effect on grain yield: Cereal grain yield was significantly higher on normally sprayed plots than on fallow sprayed plots. A moisture competition effect resulting from the ineffective control of skeleton weed by the fallow spray method, appears to have been responsible.

Application of nitrogen as fertiliser at seeding or as a foliage spray later gave comparable increases in grain yield in all plots.

Soil Fertility Studies

Laboratory and field investigations on soil fertility continued, but field studies have been in abeyance because of resignation of the Senior Research Agronomist. Laboratory investigations have been concerned primarily with the solubility, availability and residual value of phosphate in regional soils, and with assessment of the soils' nitrogen status.

Phosphate Solubility and Availability.—Evaluation of various chemical extraction procedures, for the measurement of the phosphate fertiliser requirements of soils continued. Field and pot experiments have indicated that of the methods tested the NaHCO_3 extraction technique is the most reliable. Extensive field and pot experiments covering a diversity of soil types have been initiated to further test the reliability and practical value of that method.

Residual Value of Fertiliser Phosphate.—Losses of fertiliser phosphate availability under various conditions of temperature, moisture status, pH, time, and salt concentration, are being studied in pot experiments. The phosphate sorption characteristics of the test soils are under investigation in a parallel series of laboratory studies.

Methods of Assessing Soil Nitrogen Availability.—That more satisfactory results are obtained by incubation in covered beakers, of soil premixed with Krilium to preserve structure, and maintained at a controlled moisture content, than by the leaching tube method of incubation, was confirmed.

Correlations between nitrate produced in beaker incubated soils and the yield and nitrogen uptake of oats grown in these soils in various field and pot trials were significant.

On these results, nitrification data may find an application in the prediction of crop yields.

Soil Organic Nitrogen Fractions as Nitrogen Availability Indicators.—Assessments continued of soil organic nitrogen fractions, which are (a) easily oxidised to nitrate by alkaline permanganate and (b) easily hydrolysed by dilute mineral acids; as indicators of nitrogen availability.

The latter fraction appears to provide the better indication of actual availability of nitrogen. The fraction oxidisable by permanganate gives results more comparable with total nitrogen estimations.

Acid Hydrolysis in re Organic, Soil Nitrogen Constituents.—The various constituents of organic soil nitrogen brought into solution by acid hydrolysis were also investigated. Recently acquired Van Slyke equipment was used with satisfactory results on standard amino acid samples. This is preliminary to its use in determining the amino acid content of soil hydrolysates.

Distribution of Nitrogen, Phosphorus and Potassium in the Wheat Plant.—In collaboration with the agronomy section of the Institute an attempt was made to follow changes in the nitrogen, phosphorus and potassium content of the straw, chaff and grain of wheat in the post-flowering stages of development. Of particular interest was the finding that where nitrogen was not limiting, uptake of this element from the soil continued almost until wheat plants attained full maturity. On the other hand, in soils of low nitrogen content the uptake of nitrogen ceased soon after flowering.

DIVISION OF MARKETING AND AGRICULTURAL ECONOMICS

State Marketing Bureau

Marketing Boards.—Five producer-controlled boards continued to function under the Marketing of Primary Products Act, 1927-56. They are respectively the Egg, Rice, Navy Bean, French Bean Seed and Wine Grapes Marketing Boards. Action is proceeding in finalising the affairs of the Potato Marketing Board, in liquidation.

One of the Ministerial nominees on the French Bean Seed Marketing Board resigned. A replacement was nominated.

Polls and Elections.—Two polls for the election of producer representatives were conducted under the Marketing of Primary Products Act:—

- The triennial election of five producer representatives to the Navy Bean Marketing Board.
- A by-election for the election of one representative to the Egg Marketing Board in respect of Electoral District No. 2 (northern half of State) following decease of a member.

Apart from the Marketing of Primary Products Act two polls were conducted for the election of producer representatives:—

- The triennial election of four producer representatives to the Dried Fruits Marketing Board; the Minister for Agriculture and Food Production having been made responsible for these elections, by an amendment of regulations under the Dried Fruits Act of New South Wales.

- The triennial election of State Councillors of the Potato Growers' Association, conducted by request.

Market Reports; Daily, Weekly, Monthly.—As required by the Marketing of Primary Products Act the Division continued to obtain and publish information relating to the marketing of farm products.

Daily reports were prepared for broadcasting over the national network of the Australian Broadcasting Commission and for publication in the Division's *Daily Wholesale Price Quotations*, covering trading operations at all wholesale markets in the Sydney metropolitan area. Newspaper and broadcasting organisations' interest in these reports has increased.

The collection of retail prices daily was maintained. Analyses of the results of the survey carried out in 1956-57 on retail fruit and vegetable establishments in the metropolitan area were completed. The daily retail price collection now covers 22 suburban retail shops and eight licensed barrows in the city area.

The Weekly Marketing Notes continued; covering reports on the stock sales, at Homebush, for cattle, sheep and pigs, and the reports on prices and supplies of fruit, vegetables, meat, poultry, grain, miscellaneous farm produce and processed products.

Cold storage statistics for eggs, butter, cheese and fruit were collected and published; and a series of average monthly prices for a comprehensive range of farm produce was computed from the Divisional records and published in the *Weekly Marketing Notes*.

Wholesale and retail stock feed prices were collected monthly. Compilation of the statistics relating to the arrival of primary products into Sydney by rail and sea, from interstate and intra-state sources, continued.

Numerous inquiries for detailed market information for many farm products were received from a wide variety of sources, including State and Federal Departments, banks, processors, trade agencies, and growers' organisations.

Statistical Analyses of Seasonal Price Patterns.—For certain fruits and vegetables the analyses were finalised, and the data have been published in two articles on economic aspects of fruit and vegetable marketing.

More detailed analyses of price-quantity relationships were carried out in respect of bananas and also peas and beans. The outcome of these projects will be published during 1958-59.

Crop Reviews and Forecasts.—Forecasts of production were prepared for wheat, oats, broom millet, potatoes and citrus fruits. The basic data for these were supplied by Departmental district officers and a corps of honorary crop correspondents.

Research into the graphical regression method of forecasting, particularly for wheat and oats, continued.

The monthly publications, *Review of Grass Conditions* and *Pastoral Outlook* and *Report on Production Trends* were continued.

Meteorological Services.—An officer of the Division continued as Departmental representative on the State Climatological Committee of New South Wales and as liaison officer with the Sydney Weather Bureau. Extensive meteorological records were maintained. Meteorological advice and data in relation to farming pursuits were again provided for officers of the Department and members of the public, especially in connection with crop forecasting. At the request of the Commonwealth Department of Primary Industry, during the 1957-58 drought a weekly report was prepared on meteorological conditions and their effect on primary production and pastures.

The Division acted in liaison between the Department and the CSIRO in the CSIRO attempts to produce rain by cloud seeding during the 1957-58 drought, and in the long-range experiment aimed at increased rainfall on the Upper Darling Basin.

Economic Research

A wide range of research into problems affecting rural industries was continued, based largely on data from surveys.

The Division's effective research staff increased by three officers, since one vacancy was filled and two officers who had been on extended study leave returned. However, the calls made on the Division were such that a heavy backlog of work has accumulated. Work on a variety of economic problems of agriculture continues to be requested by field officers and

regional advisory committees. The rate and number of requests are considerably more than can be handled by the resources of the research section.

The principal research projects which were continued during the year or were in progress at the end of the year are as follows:—

Survey of Small Dairy Farms on the Far North Coast.—This survey aimed to pin-point ways and means by which operators of high cost farms could improve their efficiency and management and make adjustments to the less favourable economic conditions being experienced in the dairy industry. This work was in co-operation with Division of Plant Industry.

The final report showed that on a very large proportion of the survey farms, amalgamation of two or more properties into larger units appeared to be the only feasible means of achieving a financial improvement.

Such amalgamations are taking place but, without official assistance or encouragement, the process will be very slow. It indicated also that supervised investment programmes, of the United States Farm Home Administration type, could eliminate some of the high-cost producers in the survey area. However, in some cases the small high-cost farm probably represents the best use of the limited human physical resources available to it. The problem farms included a large proportion of aged, infirm and widowed operators. Many of the farms were located in the poorest portions of each dairying district. They had been settled in brief, high price periods when the outlook for dairying appeared comparatively favourable.

Farm Development and Fertilizer Requirements Survey.—During the previous year, Australian Fertilizers Pty. Ltd. requested a large-scale survey, involving 500 farms in the Slopes, Tablelands and Riverina districts, to ascertain the likely future demand for superphosphate. The report has now been issued.

It concluded that superphosphate purchases could increase by 75-85 per cent. by 1962, given favourable season and economic conditions.

It also indicated that a return to 1955-56 wool prices (prices at the time of the survey were about 25 per cent. higher than those) would reduce the expected percentage increase in superphosphate use to 40-45 per cent. The average wool price for the current selling season, 1957-58, is approximately the same as that in the 1955-56 season.

The responses to questions about possible purchases in the event of poor seasonal conditions, suggested that in those circumstances the increase might be reduced to 35-45 per cent. by 1962.

The survey also yielded additional information about improved pastures; past and future developmental plans. This data is being collated. When it is completed it will be of value to research and extension workers and private firms.

Economics of Aerial Pasture Improvement.—In the survey of farm development and fertilizer requirements, very widespread interest among landholders in aerial topdressing and its possible results was noted.

To secure information on the economics of this subject, a mail questionnaire was forwarded to 406 graziers and farmers believed to have used aircraft for pasture improvement. Valuable information was obtained also from discussions with landholders who had used aerial topdressing and from others connected with the industry.

A report on this subject was published in the Division's *Review of Marketing and Agricultural Economics*.

The survey revealed that the graziers who had aerially topdressed their pastures for four years or more estimated their carrying capacity had increased by 50 per cent. during the first two years, and by more than 100 per cent. in four years. Average application of fertilizer was 0.95 cwt. per acre per annum.

Many graziers also referred to other benefits from pasture improvement, such as the wool cut increase, which averaged 2.2 lb. per sheep, and the better health and condition of the sheep, attributed to better nutrition.

Some information was obtained regarding factors which affect the response from aerial pasture improvement, and how the response compares with traditional methods of improvement.

A comparison of response, coupled with landholders' estimates of costs, shows that aerial pasture improvement is a very profitable investment at the wool prices ruling in the last three years. Over this period the percentage return on capital from such an investment would have been 16-30

per cent. depending on the exact level of wool prices and the amount of labour required for carrying the extra sheep which the pasture improvement made possible.

However, the increase in carrying capacity is slow in the initial years, and it is important to stress that aerial pasture improvement is attractive mainly as a long-term investment.

Agricultural Experiments and their Economic Significance.

—Senior Economics Research Officer Mr. A. G. Lloyd presented to the Second Conference of the Australian Agricultural Economics Society at Canberra a paper on this subject. This is to be published in the Society's 1958 *Proceedings* and in the Division's *Review of Marketing and Agricultural Economics*.

The paper discussed the problem of organising agricultural experiments such as to permit their economic interpretation and application, since most Australian experiments as at present organised are of very limited use in those respects. The paper contended that the aim should be to provide the type of information required by a farm management extension worker, to assist him in estimating for particular farms the most profitable farm organisation and rates of usage of feed, fertilizer, etc.

Survey of Costs and Returns from Fodder Conservation.—

A questionnaire has been prepared for distribution to farmers in the Yass area, to Departmental Experiment Farms and to selected farmers. In addition, material has been collected from Departmental and C.S.I.R.O. officers and collated from the literature on the subject. An article on "Costs and Returns from Fodder Conservation" is in preparation.

Trends in the Quick Frozen Food Industry.—An article on the development and possible future trends of the quick frozen food industry was published. The lack of statistical data about production and consumption made a detailed examination of the industry in Australia impossible.

Expansion of the industry in the United States of America and in New South Wales were studied; the latter being fairly representative of the position in the other States of the Commonwealth. It is unlikely that the industry in Australia will follow the same pattern of development as in the United States. Much will depend upon action initiated by the industry itself, mainly through market research and improved retailing, and on reliable supplies of raw materials, particularly fruit and vegetables.

Even with effective action in those directions, it seems likely that for a long time and for the majority of consumers, the role of quick frozen foods will be confined to that of supplementing the fresh product.

Southern Tablelands Regional Research and Assessment Study.—Field work was completed in November, 1957, and tabulation and analysis of the results have commenced. The data on fodder conservation have been analysed and will be ready for publication by September, 1958.

Irrigated Land Use in the Southern Murray Basin.—Research into the question of promoting integration between land use in irrigated and adjacent dry-farming areas in south-eastern Australia has been undertaken. This work included investigations of conditions in northern Victoria, carried out by an officer of the Division whilst on study leave at the Australian National University.

Farm Management Study, Nowra District.—Preliminary arrangements have been made for a farm management study in the Nowra district. The co-operation of about forty dairy farmers in the area will be sought, with the objective of making annual analyses of their records in order to determine where there is scope for improvements in managerial efficiency. The work may lead to increased productivity not only on the farms concerned, but over a wider area, as the results become available.

History of Land Settlement, Monograph.—By special arrangement with the Government Printer a monograph of 290 pages under the title of "An Outline of Closer Settlement in New South Wales: Part I—The Sequence of the Land Laws" was published as the September-December, 1957, issue of the *Review of Marketing and Agricultural Economics*, Vol. 25, Nos. 3-4.

The publication of this study by Mr. C. J. King, Chief of the Division, follows his earlier "The First Fifty Years of Agriculture in New South Wales", which was also printed in the *Review* as a series of articles extending from Vol. 16, No. 8, Aug., 1948, to Vol. 17, No. 4, Dec., 1949.

A special printing of 1,500 copies of the later work, in book form, was also completed by the Government Printer, and copies are available for sale (10s.).

Other Research Projects.—In addition to foregoing projects, a number of other research undertakings were continued.

Among these was the Farm Type Classification in New South Wales, a project in which the Division has co-operated with the Commonwealth Bureau of Census and Statistics. It is at an advanced stage, and preliminary results of a classification of returns for the 1955-56 season have been published by the Bureau.

Scrutiny of Rural Credit Position.—The Division continued to maintain close scrutiny of the rural credit position, and has co-operated closely with the newly established Rural Liaison Service of the Commonwealth Bank of Australia.

Advisory, Educational, and Extension Activities

Policy Advice Affecting Agriculture.—One of the Division's functions is to provide advice when requested on matters of economic policy affecting agriculture, and advice of this nature has been freely given.

The Division has regularly assessed the supply-demand position for farm machinery and for all basic materials used in the rural industries, including building materials, fertilizers and high protein feeds. It has also continued to provide advice with regard to the import/export position of coarse grains, protein concentrates and other commodities.

The Division has been concerned in the formulation of policy for developing irrigation projects in the Murrumbidgee Valley. Comments were prepared on proposals put forward by the special Committee (Blowering Dam Committee "A") for promoting mixed stock-raising and horticultural farms in the "Billabidgee" region. Emphasis was placed on the need to promote systems of land use which would ensure maximum flexibility, and the need for closer enquiries into ways and means of using irrigation to assist stability in dry farming areas.

Consideration has also been given to an economic report prepared by the Water Conservation and Irrigation Commission on the proposed Coleambally Project.

The Division was represented at the June, 1958 meeting of the Advisory Panel of the Hunter Valley Research Foundation, held in Newcastle. There, the various problems of future work of the Foundation discussed included that of research into the land use of the Hunter Valley and its regional income. The Division also co-operated with the Foundation by participating in joint activities with the Foundation's Economic Research Committee.

Lectures for Agricultural Colleges.—The Division provided a lecturer in Agricultural Economics at Wagga Agricultural College, as for some years past, and provided assistance also to the lecturer in Agricultural Economics at Hawkesbury Agricultural College. The Division is responsible for examining in Agricultural Economics at each of these colleges.

Lectures for University School of Agriculture.—At the request of the Professor of Agricultural Economics, a course of twenty-seven lectures in Production Economics was presented to students in Agricultural Economics in the School of Agriculture at the University of Sydney, by an Economics Research Officer of the Division.

Lectures for Extension Schools, Farmer Courses, Conventions.—As in the past, officers of the Division addressed numerous Departmental extension schools; and conventions and meetings organised by the Agricultural Bureau, by other farmer groups, and by the New England University. Officers have addressed professional societies and various other organisations on many economic aspects of the rural industries.

DIVISION OF INFORMATION SERVICES

The Division continued to provide the following services to extension; editing; responses to inquiries by telephone, by correspondence, and at the counter; publications distribution; library; development of radio, photograph aids, cine film library, and display art/designing as group/mass media; organisation of the Agricultural Bureau as a group medium; women's services; organisation of short-term schools/courses; projects in extension programming; development of extension equipment resources, and promotion of subject-matter officers' interest and skill in using extension aids.

Officers Overseas

Three officers of the Division have been overseas during the year, and two of the three will return later in 1958.

The Divisional Chief was away from 26th June to 5th October, 1957. He attended the International Meeting on "Methods and Programming in Rural Extension", 2nd-31st July, 1957, at the International Agricultural Study Centre, University of Wageningen, The Netherlands. Subsequently, he spent periods with the Food and Agriculture Technical Information Service of the Organisation for European Economic Co-operation, Paris; the National Agricultural Advisory Service of England and Wales; the Agricultural Advisory Services of Scotland; the Federal, State, and County Extension Services in U.S.A. and other bodies affecting agriculture in each country visited.

Central Librarian Mr. Eoin Wilkinson left Australia in September, 1957, for one year, to attend the post-graduate school in Librarianship at the University of Chicago, U.S.A. and visit Agricultural libraries elsewhere in the U.S.A. and Europe.

Senior Extension Officer (Women's Service) Miss M. M. Foskett left Australia in May, 1958. Miss Foskett is attending in the U.S.A. an International course of three months' duration, on "Leadership Development for Home Economics Programs", and the 9th International Meeting on Home Economics.

Editing Section

The section maintained production of the monthly journal *The Agricultural Gazette of N.S.W.*, the monthly *Poultry Notes*, the bi-monthly *Dairy Topics* (known in earlier years as *The Herd Recorders' Letter*), the weekly *Press Copy*, booklets/pamphlets/leaflets within the range of approximately 700 titles, and special handbooks as for short-term schools.

The Agricultural Gazette of N.S.W.—Circulation of the monthly (96 pp. illus., incl. 43 pp. adverts., colour cover) increased from 32,000 to 33,750. Advertising revenue is reported as £12,347 for Gazette space, compared to £11,895 in 1956-57.

Poultry Notes.—This monthly, most of which issues have appeared also in the Gazette, has a circulation of 5,800, a reduction of 500 from the 6,300 of the previous year. Advertising revenue for *Poultry Notes* space amounted to £162.

Dairy Topics.—Financed by the Dairy Industry Extension Grant, this bi-monthly has a circulation of 18,100. Three years ago the circulation was only 2,100. Until 1955-56 it was confined largely to herd-recording farmers. Since January, 1956, it has been posted direct by the Printer to all dairy farmers.

Booklets, Pamphlets, Leaflets.—One hundred and twenty-seven publications, after editorial attention, were sent to the Printer and ninety-nine received from the Printer to 30th June, 1958. In 1956-57, 158 were sent to the printer and 179 were received; the 179 including many submitted in 1955-56. Similarly, of the ninety-nine received from the Printer in 1957-58 some fifty-nine had been sent to the Printer in 1956-57.

Advertising revenue from space sold in booklets was £605. The booklets in which space was sold were *Worms of Sheep*; *Feeding for Milk Production*; *Rearing Dairy Calves*; *Culling Poultry*; *Scientific Poultry Feeding*; *Tomato Culture*; *Building Up Fertility in the Garden*; and *Home Orchard Calendar*.

Press Copy.—Circulation of this weekly was described in last year's report as "near to 1,000". It is now 1,150. Primarily, of course, it is published for use by newspapers and radio stations. There are some 350 newspapers and radio stations in the mailing list. Some 624 items were published in this year's fifty-two issues. At least one item of women's interest or farm home interest appeared in thirty-six of the fifty-two issues.

Stereo Loans.—Loans of stereos of blocks used in *Press Copy*, to newspapers, totalled 180. Only fifteen of the weekly broadsheets carried illustrations. This would account for the much lower total of loans by comparison with the total of 350 in 1956-57.

Roneoed Press Releases.—One hundred and forty-three statements, a majority from the Ministerial office, were stencilled, roneoed and despatched to newspapers, radio stations, and others. Approximately 39,182 copies from the 143 titles were assembled and despatched. The 1956-57 figures were 185 statements and 48,954 copies.

Farmer Handbook Volumes.—Work on two volumes, (i) Weeds and (ii) Pastures, proceeded throughout the year.

The 1956-57 report recorded that in April, 1957, a second set of galley proofs for the Weeds volume was requested of the Printer. This was received in July, 1957. By February,

1958, all page proofs were to hand. In June, 1958, the completed work, including 154 black and white plates and eighty-two colour plates, was submitted to the Printer for publication. The Printer has decided to increase the printing from 3,000 to 5,000 copies.

The Pastures volume has advanced to Chapter IX. There will be eleven chapters in the volume. Work on chapters VIII and IX during the year has entailed close liaison between the compiling officer, the Science Service Branches, and the Specialist Agronomist (Weeds).

Enquiry Counter and Publications Distribution Section

Enquiries.—Excluding the enquiries handled by the Home Garden Enquiry Officer located in this section (his work is reported in a subsequent paragraph), the section handled 78,314 enquiries by comparison with 87,687 in 1956-57. The difference is almost entirely due to fewer telephoned enquiries.

<i>Enquiries—</i>			
	1955-56	1956-57	1957-58
Telephoned ..	23,190	19,064	11,288
Postal	22,969	21,222	20,145
*At the counter	38,826	47,401	46,881
Totals ...	84,985	87,687	78,314

*“At the Counter” figures do not include the enquiries received at the Department’s R.A.S. Show Information Counter, for which records were not kept.

Publications’ Distribution.—Eight hundred and ninety-three thousand four hundred and sixty publications were distributed, compared to 800,218 in 1955-56 and 891,301 in 1956-57. Of the total, some 221,167 were despatched to Regional and district officers for local distributions. *Sale publications* totalled 2,270, for a return of £638 10s. 2d. The sale publications in 1956-57 totalled 3,421, and in 1955-56 totalled 4,080. The decline is to a large extent due to less demand for the Home Vegetable Garden booklet.

Home Garden Enquiry Officer’s Services.—The H.G.E.O. maintains a separate record of his activities. This is with a view to having some measure of the volume of enquiries which would, in the absence of this position, be referred to subject-matter officers in other Divisions or Branches with consequent interruption of their attention to commercial farm problems. It is not implied that the H.G.E.O. statistics include all home garden enquiries. Many are simply handled by the office assistants in the section drawing upon relevant publications.

Enquiries handled by H.G.E.O.—

	1955-56	1956-57	1957-58
Telephoned ...	1,050	2,700	4,430
Postal	950	900	820
At the counter	2,000	4,000	3,750
Totals ...	4,000	7,600	9,000

The H.G.E.O. responses to the 9,000 enquiries included distribution of 11,500 publications; 1,500 less than in 1956-57. As indicated in the 1956-57 report the publications’ distribution would be much greater if the Department had an improved range of floricultural and allied literature. The officer is unable to accomplish this however. Pressure of enquiries and poor accommodation make additional writing unlikely. In fact the volume of work has increased far beyond the capacity of one officer.

Regional Publicity Officers

There are now eight Regional Publicity Officers. Their work is reported under “Regional Extension Services”.

Library Services

Staff and Allied Matters.—Central Librarian, Mr. Eoin Wilkinson, has been overseas since August, 1957, at the University of Chicago post-graduate librarianship school. The Principal Librarian of N.S.W. has made available Mr. Douglas Hunt, a former Department of Agriculture and Hawkesbury Agricultural College librarian, as replacement for 12 months.

It has been possible to restore full-time librarianship in the National Herbarium branch library, Botanic Gardens, and another officer for one day per week to assist in cataloguing. A concerted effort has been made to overcome arrears and re-organise that branch library in the course of rehousing it.

Certain sections of the branch library in Plant Industry Division have been transferred to the central library, and the central library staff have taken over the country circulation previously handled in Plant Industry.

The part-time librarian services for Biological, Entomological and Chemist Branches, and for the Divisions of Marketing and Agricultural Economics and Dairying, have been maintained. Chemist Branch has received less service than was intended. The Biological Branch and the Dairying Division Branch libraries have been rehoused.

A full-time librarianship as between Animal Industry Division and Glenfield Veterinary Research Station branch libraries has been restored. For a period in the previous year the officer in this position had also the responsibility for the National Herbarium library.

A full-time librarianship position has been maintained at Hawkesbury Agricultural College, but there is not a formal librarian at Wagga Agricultural College or Wagga Agricultural Research Institute.

The librarians, eight in all, less half the time of one officer who is shared with Conservation Department, are under continued pressure. They do not have the time to take the initiative in various directions—including the stimulation of search interests amongst subject-matter officers of the Department, such as they would like.

Library Accessions.—Fourteen thousand six hundred and fifty-eight items (books, periodicals, bulletins, reports, etc.), were accessioned from many parts of the world, compared to 11,951 in 1956-57 and 10,082 in 1955-56.

Books accessioned	535
Periodicals accessioned	9,039
Bulletins, Reports, etc., accessioned	5,084
Total accessioned	14,658

Of the 535 new books, 158 were acquired with Commonwealth funds under Agricultural Extension Services Grant Project 213, for location in country offices. There are now 1,234 books so acquired, providing select collections in 52 country offices of the Department.

Agricultural Colleges’ Book Purchases.—In addition to the aforementioned book purchases, 382 books at a cost of £421 have been acquired this year for the two Agricultural College libraries. The purchases were made from special trust accounts, the funds derived from the students’ library fee system recently inaugurated at each of the colleges. The central librarian has performed the requisitioning, and for the Wagga College has also catalogued them and supplied the cards.

Central Library Loans.—Twenty-eight thousand five hundred and seventy-two items of literature were loaned, compared to 26,266 items in 1956-57; 21,501 items in 1955-56; and 18,352 in 1954-55. In summary, the figures show a 50 per cent. increase in loan rate in four years from 1954-55:—

Periodicals circulated,	
per lists	24,092 (av. 463 per week)
Miscellaneous loans	4,480 (av. 86 per week)
Total	28,572

Bi-monthly Accession Circulars.—At approximate intervals of two months, a classified “Select List of Publications Received by the Library” was compiled, roneoed, and despatched to officers throughout the state. This year the mailing list has been revised, and rationalised to make good use of the Regional system of Departmental field organisation whilst not detracting from the desired element of individual officer personal contact with library service.

Photo-copying Service.—Three hundred and seventy-nine photo-copying projects were handled, involving 3,600 sheets; an approximate 50 per cent. increase on the rate of work in 1956-57, the first effective year of the service. The service is being allowed to grow at ‘natural tempo’, without publicity.

Reference Searches.—Subject bibliographies have been prepared at the request of field officers and specialists. The request rate is sufficient to indicate that the library resources of the Department are thoroughly appreciated as an extension bridge between research and experimentation and advisory services.

Other Institutions’ Use of the Library.—Loans to other institutions, Commonwealth and State, and the Universities, and use of the library by officers of commercial organisations and the press, have also indicated the effectiveness of the library resources.

Display Art/Designing Services

The state position of Display Artist/Designer remained vacant, the Public Service Board office having undertaken in May, 1957 to review the position again in June, 1958, in the light of the funds position at this time. Thus there is only one Display Artist/Designer. His salary is provided from a Commonwealth Grant. Meanwhile, officers of other sections of the Division continue to assist in the Display section manually, at every convenient opportunity.

Show Exhibits and Other Displays.—The Department's display, and information bureau supported by a film theatre, at the Sydney Royal Show, April, 1958, was the major undertaking. It featured "Bovine Pleuropneumonia Campaigns" in one display bay, and "Apple Black Spot Eradication Campaigns" in the other. An apicultural display by the Department elsewhere in the grounds was also assisted.

The display section also assisted the local show efforts of country officers of the Department at Grafton, Wagga, Lismore, Leeton, Orange, Bathurst, Mullumbimby, Byron Bay, Maitland, Newcastle, Taree, Tamworth, Bega; and displays at Hawkesbury Agricultural College.

Assistance was variously comprised, from planning, requisitioning, ticket- and sign-writing, and artwork, to actual constructional help.

Equipment, such as automatic slide projectors, propomats, and transparency boxes, was kept in service and despatched for country officers' displays as needed.

Lecture or Demonstration Aids/Charts.—In addition to many miscellaneous small aids, 21 major aids in colour were prepared for various Divisions; and 10 graphic illustrations were prepared for 35 m.m. transparency series. On too many occasions the opportunity to help an officer had to be declined because the work could not have been fitted into the one display artists' work programme.

Assistance to Editing Section.—Layout design and finished artworks in line, in line and half tone, and in tone; retouched photographs required as block copy; maps; graphs; and booklet covers, were prepared for the Editing Section. The volume of assistance desired by the Editing Section was beyond the capacity of the one Display Artist.

Photographic Aids Services—"Still" and Ciné

Field Officers 35 m.m. Photography.—The outcome of subject-matter officers' photography was 5,420 colour and 5,330 black and white slides returned to them for extension uses; compared to 4,340 and 4,530 respectively, in 1956-57. Tutorial comment was forwarded by the Photographic Aids Section with the return of slides. Subject-matter selectivity and general quality of field officers' photography for extension purposes continued to improve.

Tutorial Letters.—459 letters conveying tutorial advice on photographic technique were sent to country offices; compared to 560 in 1956-57. Some 4 per cent. of the letters were in response to officers' requests for information on advanced or specialised types of photography. This special-interest trend was subject of comment also in last year's report.

Advice on Photography and Equipment to Officers Visiting the Photographic Aids Section.—A notable volume of the Photographic Aids Section's time has been devoted to country officers and head office subject-matter specialists who have visited the Section for advice on method and/or equipment. Many of the officers concerned have sought advice prior to personal purchase of equipment, their interest therein having been stimulated by their prior access to Departmental cameras and projectors or other viewing aids. In every instance the officer has intended to use his privately acquired camera, etc., to supplement the official equipment.

The Photographic Aids Section's advice has also been sought by other public service bodies, i.e., not within the Department of Agriculture.

Central Photographic Library.—By critical selections from the results of field officers' and subject-matter specialists camera work, 634 titles were added to the Division's photographic library; compared to 468 so added in 1956-57. This library now totals 2,742 negatives, comprehensively cross-indexed. It is drawn upon for illustration of publications and reports for special sequences of slides, for print enlargements and transparency enlargements used in displays, and to meet the interests of technical visitors, from other countries, passing through the Division from time to time.

35 m.m. Slide Sequences.—Six special sequences were prepared for lecture aids on request. These included a series on wheat conditions, for the Wagga Agricultural Research

Institute, and a series for the Under Secretary's use in the course of an overseas itinerary occasioned by an F.A.O. Conference in Rome.

Special Assignments.—These included colour photographs of some species of citrus, for despatch to U.S.A. for identification; numerous maps, in black and white and colour, for lecture aids; six maps of rice areas, in colour, for Plant Industry Division; T.B. symptoms in post-mortemed dairy cows; glass house interiors for Chemist Branch; close-up photography of seeds; and numerous other matters requiring the special skills of the Photographic Aids Section.

Ciné Film Production Matters.—The work print of a 16 m.m. ciné film "Farm Machinery Maintenance", in production by the Department of Interior Film Unit for the Department of Primary Industry, was critically viewed. Suggestions were made for improvements during the final editing.

A script was written for a 35 m.m. ciné film "Argentine Ant Menace". This film is to be screened in commercial theatre circuits. Tenders for contract production were examined and a recommendation was made. The subsequent cinematography under contract has been continuously supervised, and was virtually completed at 30th June, 1958.

Studies of B.H.C. toxicity in valves were photographed on 16 m.m. ciné film for Glenfield Veterinary Research Station.

Prints of "Establishing Irrigated Pastures", a 16 m.m. ciné film in colour, produced by this Division, were supplied to the Queensland and Western Australian Departments of Agriculture.

Ciné Film Library Service

The net affect of re-assessments, withdrawals for various reasons, and additions, is that there are now 198 useable 16 m.m. ciné films in the Division's film library, an increase of seven. Good liaison has been maintained with other libraries, including the Information Offices and/or Consulates of overseas Governments represented in Sydney, the public relations sections of commercial organisations, and the New South Wales Film Council. Films held by them have been readily available for collation in programmes prepared by the Division for loan to country offices, and to branches of the Agricultural Bureau owning projectors.

Collation and Loan of Ciné Film Programmes.—In terms of individual films, 1,852 were loaned and, on return, were checked and repaired where needed. They were collated in 662 programmes. The respective figures were 1,084 films in 342 programmes in 1956-57; and 806 films in 300 programmes in 1955-56.

In almost every instance the collated programme was screened on more than one occasion during the period of loan. Some of them were screened for as many as six groups during the loan.

Some 1,389,900 feet of film were bench-checked on return from borrowers, and repaired where repair was necessary and practicable.

Film Appraisal Screenings.—The Division organised an intra-Departmental appraisal group and provided the screening on 17 occasions, compared to 24 in 1956-57 and 19 in 1955-56. Appraisal screenings are aimed at securing the advice of subject-matter officers in determining the relative value of particular films newly under our notice, in extension service, or the conditions under which a film may be included in a Departmentally presented programme. For example, a film may be screened in a Departmental programme in the absence of a relevant subject-matter officer or it may be so screened only if such an officer is present to relate it to our conditions and lead the discussion.

Radio in Extension Service

The position of Extension Officer (Radio) was vacant from July to December, 1957. In December it was re-filled by the appointment of Mr. David Jamieson, formerly Publicity Officer attached to the Tamworth Regional Office and experienced by previous employment in various country radio stations.

Tutorial Service for Country Officers.—This is an important phase of the duties of the Extension Officer (Radio). Some of the tutorial service has been achieved during field officers' visits to Sydney, some of it by correspondence arising from scripts coming under notice, and some of it during rural itineraries of the Extensions Officer (Radio). In the current year, the officer has worked in an additional medium, viz., a series



Mechanised Fodder Conservation Field Day

In Southern Region one of the best attended field days of the year was promoted by the Farmers' and Settlers' Association co-operatively with the Regional Extension Service.

(Photo. from Wagga Office.)

of short tutorial tape-recordings for loan to country officers. This series will be subject of further preparation before the loans are inaugurated.

Tutorial Itineraries in Rural Areas.—Travel funds were not sufficient to meet the needs in this respect. However four itineraries were accomplished.

Mid Coast and Hunter Region was visited for seven days providing tutorial work with the Regional Publicity Officer, Maitland, and district subject-matter officers at Kempsey, Taree and Maitland; and liaison with the radio stations in those areas.

Western Region was visited for five days, providing similar contacts with the officers and the radio stations in the Orange, Bathurst and Dubbo areas.

Northern Region and the north-west were visited for five days, providing similar contacts with the officers and the radio stations in the Tamworth, Armidale and Gunnedah areas.

Mid-Western Region was visited for three days, providing the contacts with officers and radio stations in the Parkes, Young and Cowra areas.

The tutorial advice and demonstrations were concerned with tape-recorder operation and tape dubbing, voice production, programme planning and presentation, interview techniques, and allied matter.

Inevitably the Extension Officer (Radio) during these itineraries was also drawn into or took the initiative in respect of advice on other extension media, including press writing, use of ciné film projectors, public address systems, and group activities.

Tutorial Tape Recordings.—Six scripts of four minutes' duration have been prepared, dealing with aspects of radio speech and radio programme presentation. These are part of the new series, aforementioned.

Equipment Issues.—Three new tape-recorders of the higher quality required for broadcasting purposes were issued, respectively, one to Tamworth, Cowra, and Bathurst office of the Department.

Each of the higher quality tape recorders at Regional offices (eight) has been fitted with a radio tuner, so that the Regional office may monitor the farm radio broadcasts in that part of the State. Many of these broadcasts include material from or the voices of district officers in the Region. The monitoring is expected to help the improvement of Departmental contributions to farm radio sessions.

A volume of accessory equipment has been issued to tape-recorder offices, Regional and district; tapes, tape cans, inverters, cables, adaptors, microphones, etc.

Survey of Farm Broadcasts.—A questionnaire survey of N.S.W. radio stations in terms of farm broadcasts was undertaken. It sought to establish beyond doubt which stations present farm broadcasts, how often such broadcasts occur, their duration, their sponsorship or otherwise, the sources of material, the extent of Departmental Officers' participation, and allied information. All but one of the Australian Broadcasting Commission's Regional Stations, and twenty-five of the thirty-two commercial stations responded. It was an 84 per cent. response, within three weeks. Of the eight stations which did not respond, information from other sources, including Regional Publicity Officers' monthly reports, has been collated.

Summary:—

- (i) In N.S.W. 462 separate broadcasts per week are designed for farm audiences, and 132 of them are sponsored. All sponsors advertise products for farm or household use, or are processors of farm products.
- (ii) The number of farm broadcasts per station ranges from one to thirty-six per week.
- (iii) Australian Broadcasting Stations broadcast farm sessions total seventy-three hours forty-five minutes per week—a station average of five hours forty minutes.
- (iv) The commercial stations' total is thirty-one hours seventeen minutes per week—a station average of one hour two minutes, excluding stations which do not provide farm broadcasts.

Duration of session ranges from three minutes to sixty minutes. Weekly total per station ranges from six minutes to four hours forty minutes.

- (v) Twenty-seven (27) stations have sessions in which Department of Agriculture officers are featured at least weekly, in person and/or by tape recordings.

Eight (8) of these stations have sessions in which the Department's officer(s) participate(s) twice weekly. Officers participate thrice weekly at one station, six times per week at one station, and eight times per week at another. Only three of the forty-five stations in N.S.W. from which replies were received use Department of Agriculture officers at a rate less than once per month.



Mid-western Region Inaugurated

Mid-western, the eighth Agricultural Region in the Regional Extension Service Scheme, was established on the 31st October, 1957, with headquarters at Cowra. Field officers and committeemen foregathered with Regional Supervisor F. J. Nicholson (centre front), Under Secretary and Director Dr. R. J. Noble (left), and Regional Extension Services Chief J. L. Green (right) for this group inaugural photograph.

(Photo. from Cowra office)

is accepted by the Accountant. All correspondence, except that of an urgent nature, was addressed to the respective Regional Supervisor, whether it was from a field officer or from head office. This procedure has been changed. Only matters relating to policy and staffing are now addressed to the Regional Supervisor. He receives copies of other correspondence.

TRAINING OFFICERS

The system which provides that officers of the Division of Plant Industry located at an agricultural college or experiment farm shall receive training in Regions has developed considerably. These officers are potential district agronomists. The system permits nominated officers to spend 50 per cent. of their time in the field with experienced extension officers.

The value of a training period in a Region is that the young officer, in addition to gaining wider knowledge in his own subject-matter field, spends short periods with field officers of other subject-matter Divisions of the Department and with the Regional publicity officer. Regional Supervisors have been directed to instruct the potential district officers in general departmental administration; and in methods of extension, including visual education aids, radio, press, field days, and short-term schools.

REGIONAL ADVISORY COMMITTEES

An Advisory Committee of eight members, nominated by the Minister, with the Regional Supervisor as Chairman, is operating in each Region. Each Committee meets three, or four, times a year and forwards to the Minister matters of agricultural interest.

The Advisory Committee for Western Region has been instrumental in having a special stock train operate from Mudgee on Sundays. Thus stock are at the markets on Monday morning without being held in yards over the week-end. Consequent demand for this service has been such that the Railway authority has had to run an extra division of this special stock train.

The North Coast Advisory Committee has been largely instrumental in securing an artificial stock-breeding sub-station at Lismore. The Northern Region Advisory Committee has interested itself in Schools for Farmers, as have the Committees

in all Regions, and in co-operating with the C.S.I.R.O. in rain-making experiments. The minutes and correspondence arising from each of the Regional Advisory Committees provide abundant evidence of the wide range of their attention and action.

REGIONAL PUBLICITY

The publicity officers, one stationed at each Regional headquarters, have done a remarkable job with district officers in developing Department of Agriculture publicity, particularly in the press and over the air.

In each Region there is a continual flow of acceptably readable releases to all newspapers and radio stations in the Region. Output rate of one and two-page publicity releases is about 500 per annum for each Region. Many country newspapers now have a regular weekly column, additional to casual space, devoted to Regional publicity statements.

Even greater development has occurred in respect of radio. Prior to appointment of Regional publicity officers, occasional field officers of the Department had regular commitments with country radio stations. To-day, almost every country station broadcasts material regularly from Departmental officers and/or releases. Moreover, sponsors are now relatively eager to meet the costs of good listening-time channels for the farm broadcasts. In that section of this Report of the Department which deals with Division of Information Services, considerable detail is provided—from a questionnaire survey conducted by the Extension Officer (Radio).

FIELD DAYS AND CONVENTIONS

Organisation of field days, conventions, short-term schools, and similar gatherings of farmers, is more decentralised since the establishment of Regions. The Regional Supervisors, generally in co-operation with a farmers' organisation, frequently the Agricultural Bureau in particular, arrange and publicise the programmes of such activities. Each Region has a duplicating machine. Thus, invitations, programmes, and such-like releases can be prepared on the spot. Effectiveness of the functions is enhanced by the audio-visual aids equipment, public address system, movie and still projectors, a tape recorder, cameras, etc., located at district as well as Regional offices as an expression of the extension equipment projects developed by Division of Information Services in the past decade.

Schools and refresher courses, generally of two or three days' duration, are increasingly requested by farmers. Each Region has conducted one or more schools each year. Attendances have ranged from 30 to 150 farmers. The usual practice is to have two or three talks in the morning in a local hall, and then to visit a property in the afternoon where further talks and practical demonstrations take place.

Southern Region

Southern is the oldest established Region, having commenced operations at Wagga on 3rd February, 1953.

New Office at Wagga.—A new office building, costing £100,000, has been erected at Wagga, and was occupied by the Department of Agriculture in May, 1958. The ground floor is headquarters of the Southern Region. Department of Education occupies the other floor.

Advisory Services.—Fifty-five field days, featuring agronomy, animal husbandry, dairying, and horticulture, were held throughout the Southern Region. Extension officers made contact with 10,272 people on agricultural matters, and 4,000 individual extension visits were made. These figures do not include farmers and others who called at the Regional or district offices for advice or made contact by 'phone.

Pasture Seed Certification.—Southern Region includes the State's most extensive areas of Subterranean clover seed production. The past season was not good for pasture seed production and resulted in a decrease in the areas submitted for certification and in seed produced.

There were 207 applications, for inspection of 25,658 acres of Subterranean clover; 61 applicants fewer and 5,144 acres less than in 1956-57. Dry conditions forced 42 growers to withdraw the whole of their area. Approximately 1,100 tons of certified Subterranean clover seed were harvested compared to 1,784 tons in 1956-57.

Production of other certified pasture seed was practically nil. Twenty-three farmers applied to have their *Phalaris tuberosa* pasture certified for seed production, but because of the dry spring most of them used their areas for grazing; only 200 lb. of seed was harvested. Four farmers applied for White clover seed certification, but there was no harvest.

North Coast Region

Artificial Stock Breeding Sub-centre.—The North Coast Region Advisory Committee, since its inception, has endeavoured to have an artificial stock breeding centre established on the far north coast. The Committee made surveys in regard to the possible demand for the service and finally submitted a report to the Minister for Agriculture and Food Production. As a result, an artificial stock-breeding sub-centre was inaugurated at Wollongbar Experiment Farm on 9th September, 1957.

Extension Activities.—In agricultural extension in the North Coast Region, field days, short-term courses for farmers, conventions, and Agricultural Bureau meetings are prominent. The Banana Growers' Federation, Primary Producers' Union, branches of the Agricultural Bureau, and other farmers' organisations co-operate with the Department's staff in organising them. Fifty-eight field days were held.

The Agricultural Bureau has undergone striking development in this North Coast Region. Only four years ago barely a branch was active on the far north coast. To-day there are twenty, three of which were formed during the past year. The Regional publicity officer has taken great interest in the Agricultural Bureau movement, helping the honorary office-bearers in arranging for speakers and discussion leaders at meetings, arranging press and radio publicity, and arranging film programmes.

Farm Demonstrations.—Seventy-six demonstrations are being conducted in North Coast Region with Dairy Industry Extension Grant funds. Most of these are in the nature of areas of pastures or fodder crops on dairy farms. The value of sowing Golden tares direct into the pasture with a sod-seeding machine has been the subject of nineteen demonstrations. Their success as extension media is such that 6,500 acres were sown to Golden tares on farms in the Richmond-Tweed area alone during the past season. In 1956-57 3,000 acres were sown, whilst in 1955-56 the acreage was practically nil.

Western Region

Aerial Top-dressing and Bulk-handling of Super.—Interest in sowing and topdressing pastures from the air has increased rapidly with the introduction of bulk handling of superphosphate to the Western Region in 1957. One firm at Bathurst has handled, in bulk, superphosphate for topdressing 18,000 acres. Some 500,000 acres of pasture have been sown or topdressed from the air in the twelve months.

Irrigation from Farm Water Conservation.—Publicity given to the value of irrigation for pastures and to farm water storage schemes, coupled with the dry season, created unprecedented demand for detailed information concerning irrigation of pastures and crops.

Many landholders have built dams to conserve water for irrigation, and boring contractors have also had a particularly busy year. Most of the individual farm irrigation schemes are comparatively small and intended for a special purpose, such as production of feed crops and pastures for fodder conservation. No definite figure is available, expressing the increase in irrigation in the Region as a whole, but a survey in Bathurst district showed that six times as many irrigation plants were sold during the past year as in the previous year.

Fast Stock Train.—One of the major achievements of the Advisory Committee for Western Region was the introduction of a fast stock train to serve the Mudgee, Bathurst, and Oberon districts. This train operates on Sundays and has stock at Flemington by Monday morning. It is very popular with farmers. Railways Department is pleased with the extent of patronage. On some occasions a second division has been necessary to cope with the demand.

Publicity.—In excess of 500 releases have been made, many containing more than one item, to thirty-two newspapers and eight radio stations. Many newspapers in the Region now have a regular weekly column of articles from field officers.

Some 714 separate broadcasts were made, with the co-operation of six commercial and two A.B.C. radio stations. Most of the commercial stations have one or more sponsored sessions dependent on material from the Region's officers.

South Coast and Tablelands Region

Schools and Conventions.—A record number of eight Schools for Farmers, with a total attendance of 600 persons, was conducted in the Region in the twelve months.

Nowra Office.—Part of a foreshadowed plan by which the Moss Vale and Kiama offices will be closed and the respective staff transferred to Nowra has been executed. Office accommodation was obtained at Nowra and in February, 1958 the dairy office at Moss Vale was closed. A dairy office is now established at Nowra.

"Research and Extension" Study.—The South Coast and Tablelands Regional Supervisor is Chairman of a Committee of officers representing the N.S.W. Department of Agriculture, the Commonwealth Department of Primary Industry, and the C.S.I.R.O.; conducting a "Research and Extension Study" in the Southern Tablelands, in the Goodradigbee and Gunning Shires in particular.

A progress report has been printed and issued. The methods of the study are likely to be the basis of other similar surveys elsewhere in Australia.

South Western Region

Increased Development in Irrigation.—Enlargement of the Burrumbidgee Dam, completion of the Blowering Dam and release of additional water into the Tumut River will in due course have increased the amount of water available for irrigation in the Murrumbidgee Irrigation Areas by 1,000,000 acre-feet per annum, more than three times the present rate. Some of the additional water is being used now, but by 1962 about 500,000 of the additional acre-feet will be available. Present population of the M.I.A. is approximately 25,000 persons and the annual value of production is around £8,000,000. From the figures, great expansion of irrigation and production in South Western Region within the next four years may be inferred.

It is anticipated that 700 stock and pasture farms and 250 horticultural farms will be established in the Coleambally Irrigation Area, located within a few miles of Leeton. Gogeldrie Weir and the canal to serve this new irrigation area should be completed by June, 1959.

each of these courses, the enrolment is slightly less than in 1957, but still satisfactory. Enrolment comparisons at the commencement of the first session were as follow:—

Course	1956	1957	1958
Agriculture.—Third Year	63	61	56
Agriculture.—Second Year	69	57	61
Agriculture.—First Year	66	64	70
Dairy Technology.—Second Year	8	15	16
Dairy Technology.—First Year	16	19	17
Food Technology.—Second Year	4	7	9
Food Technology.—First Year	8	10	7
Totals	234	233	236

Seventeen of the students are from other States or overseas, whilst 54 per cent. are from New South Wales country districts. The admission from Agricultural High Schools in 1958 was fourteen, as in 1957.

Of the 100 students admitted in 1958, forty-three had gained the Leaving Certificate, twelve had completed the fifth year at secondary school but failed in the Leaving Certificate examination, and eighteen had completed the fourth year at high school.

It was possible this year to admit to the Agriculture diploma course all eligible applicants who had applied approximately three years ahead. This represents a lengthening of the waiting list by approximately one year. Applications for admission to the diploma courses in Dairy Technology and Food Technology continued at the same high level as in 1957. Fourteen students are now enrolled in the Dairy Technology diploma course under the Dairy Industry Apprenticeship Scholarship Scheme, compared to ten in 1957. In the early stages of this scheme lack of suitable apprentices sufficiently advanced in their apprenticeship was the main limiting factor, but this has now been largely overcome, as was anticipated.

Diploma Examinations.—Eighty-one students were successful in the 1957 final examinations. Sixty of these students obtained Diplomas in Agriculture, including four at Honours standard, one of these being First-class Honours. Fourteen students completed the Dairy Technology diploma course, three being Honours standard, whilst seven completed the Food Technology diploma course, one being at Honours standard.

Ex-students.—The total of students since the inception of the College, including those in residence, is 5,440. The proportion following vocations appropriate to their agricultural training is estimated at 78 per cent.

Extra-curricular.—The Student Representative Council, The Sports Club, The Debating Society, The Dramatics Club, The Camera Club, The Student Christian Movement and the College Branch of the Agricultural Bureau helped to promote the social life and welfare of the College.

Twenty-one students were enrolled in a Life Saving Class and were examined by the Royal Life Saving Society. Twenty-eight awards were obtained.

Rifle shooting and tennis teams took part in the Inter-collegiate contests held at Hawkesbury Agricultural College last year.

In August a very successful Carnival was staged at the College to raise funds for an Olympic Swimming Pool. Approximately £12,000 was raised for this purpose during the year.

College Library.—The College library has continued to expand steadily. During the year 356 new books were added, bringing the total stock to 2,870 inclusive of all periodicals.

A check on library usage showed a slight increase over last year.

Student Tours, Visits.—Senior students in Agriculture visited the M.I.A. for instruction in irrigation techniques. They also visited northern agricultural districts as well as Belabula Farms, Canowindra, a number of properties in the County of Cumberland, and wool stores in Sydney. Senior Dairy Technology students made the annual tour of Hunter Valley factories and of major dairy produce and cold store establishments in the metropolitan area. The first year Dairy Technology students attended a Dairy Science School at Grafton. All Food

Technology students were conducted on inspections of commercial canneries and the Second Year class visited the M.I.A. during fruit harvesting and processing. This class also spent several days at Gordon Edgell and Sons Ltd., Bathurst, to gain commercial experience of vegetable processing.

Students visited the Sydney Royal and the Sheep Show for educational purposes including experience as stock attendants and/or competitors in stock judging.

University Undergraduate Courses.—Practical demonstrations in farm management and machinery were provided for students in the second year of the Sydney University Agricultural Science course and in animal husbandry for students in the second year of the Veterinary Science course.

Farmers' Schools, Conferences, Field Days, etc.—Winter schools for farmers were conducted respectively in dairy farming, poultry farming, pig raising and tractor maintenance. Schools in poultry farming and vegetable culture were provided for Junior Farmers. The summer school in apiculture was also conducted.

Three successful field days were conducted, one on pastures and spray irrigation and one on vegetables, the other being the Annual Poultry Field Day.

The 33rd Annual State Congress of the Agricultural Bureau of New South Wales and a Leadership School for members of the Agricultural Bureau, the Country Women's Association and other rural organisations, were held at the College in the winter vacation.

The facilities of the College were made available for the holding of residential conferences of Departmental Farm Managers, Senior Dairy Officers, and District Agronomists.

The Third Biennial Convention of the Society of Dairy Technology (N.S.W. Branch) was held at the College during a week-end in June.

Schools for Milk Board Supervisors and Dairy Factory Apprentices were also conducted.

Buildings, etc.—Further buildings erected on the Poultry Section, together with new equipment in the form of a hot water brooder have provided the necessary facilities for extension of the Poultry Improvement Plan (Eggs) sponsored by the Commonwealth Government.

Considerable improvements have been carried out in the Piggery Section in the way of renovations and repairs to a number of buildings as well as the erection of a modern weaning shed. In addition a considerable amount of work has been carried out on the Section's fences and a tree-planting programme put in hand.

Sheep Section facilities have been further improved by attention to fences and erection of a weighing shed. This will allow more accurate observations to be made than was possible in the past.

The potting shed for use in plant nutrition work was completed, and this added facility is proving of great value.

The dairy cattle feeding stalls, the stud stock shed and the slaughter-house have been renovated and painted. Re-erection of the River Farm hay shed which was damaged by fire during the latter part of 1956, and renovation of River Farm buildings, have been completed.

Other work completed included extensive renovations and repairs to two staff cottages, painting of several cottages, repairs to the seamstress' cottage, extensive repairs and painting of the coach and hack sheds, replacement of a number of paling fences, repair and painting of the inside of the gymnasium, painting of the inside of the Memorial Hall, renewal of guttering on the accommodation blocks, installation of air flow meter testing equipment, and gravelling and resealing of a number of roads.

Major items of equipment received during the year included irrigation equipment for the farm section, a hot water brooder for the poultry section, a battery fast charger and an Oxford precision sprayer. In addition, orders were placed for a considerable amount of kitchen equipment in an endeavour to modernise facilities in this department.

Changes in Curriculum.—With the object of ensuring that all students obtain some practical experience in the day to day management of a property, it has been made a requirement of the Agriculture Diploma Course that a period be spent on one or more approved properties during College vacations. This will materially assist in giving students, particularly those from urban areas, a better appreciation of farm and station management.

A committee has been set up to undertake a comprehensive review of the Agriculture Diploma Course. This review is expected to eliminate any overlapping and bring the course more into line with present day requirements.

Sectional Operations at Hawkesbury

College Farm.—495 acres were sown to cereals for hay, grain and silage in 1957. Conditions were favourable for the growth and harvesting of these crops and diseases were negligible. 300 tons of oaten hay, 100 tons of wheat hay and 43 tons of lucerne and red clover hay were harvested, all of excellent quality. 100 tons of oaten silage were conserved and 1,140 bushels of barley were harvested. Hay reserves at 30th June, 1958, totalled 370 tons. All of this is cereal hay. 300 tons of pasture, millet maize and sorghum silage were conserved in the tub silos, for a total of 400 tons of silage produced during the year. 484 acres of cereals were sown in the autumn of 1958, germination and early growth being very good. 10 acres of Japanese millet sown in October failed due to dry conditions, but a further 32 acres sown in January yielded approximately 3 tons of green forage per acre and made a worthwhile contribution to silage production. 15 acres were sown to lucerne at the River Farm and a further 25 acres in Clarendon No. 2.

For good pasture production the rainfall during the early part of the year was insufficient and most of the dry area pastures sown in 1957 failed. A total of 55 acres was sown to pastures in 1958 on dry areas and a further 8 acres were sown under irrigation. All irrigated pasture areas were top-dressed with 2 cwt. superphosphate per acre in the autumn and 12 acres of the best pastures received a dressing of 2 cwt. sulphate of ammonia per acre.

Approximately 16 tons of potatoes were harvested from an area of 3 acres. A good crop of pumpkins was harvested, the yield being 22 tons from an area of half an acre. Maize harvested to the end of June, 1958, totalled 550 bushels and it is estimated that a further 650 bushels remain to be harvested. Five acres of grain sorghum have yet to be harvested and the estimated yield is 150 bushels.

Satisfactory progress was made in the fencing programme, 227 chains of new fencing have been erected.

A bush fire in November burnt through scrub country between the Londonderry and Blacktown Roads. Half a mile of boundary fence was destroyed.

The storage dam was completed in time to allow 15,000,000 gallons to be stored following the heavy rains in February and March, 1958. Most of the equipment to utilise this water is on hand and installation of the pump and main line will be carried out in the near future.

One new tractor was received on loan, and another was returned to the company and replaced. A third, loan tractor was returned but not replaced. A 15 cwt. De Soto utility was purchased to replace an International 15 cwt. utility. Tractor firms again helped to make a success of the Winter School on Tractor Maintenance.

Orchard Section.—Extremely dry conditions were experienced during the spring and early summer. Trees and fruit suffered to some extent. Drought breaking rains fell early in autumn and the weather continued mild and favourable for growth and fruit development until May when dry conditions again prevailed.

Although the citrus trees in general were distressed by the hot dry weather, they recovered rapidly after the rains came. All citrus fruits sized up satisfactorily and the trees made good autumn growth. Washington Navel orange crops were light, and consequently fruit was large. Valencias and grapefruit trees produced heavier yields, and fruit was medium in size. Pear trees were forced into bud burst and blossoming in the autumn by the abnormal seasonal conditions, but sufficient buds should remain for reasonable crops in the coming season. The peach trees produced a light crop of good quality fruit. The grapes yielded light crops, and many bunches were spoiled due to heavy rains at picking time. The Pecan nut trees cropped lightly, and only a small quantity of nuts was harvested.

The orchard section co-operated in work on fruit fly control conducted by the Entomological Branch, Division of Science Services.

The trees planted to establish a citrus arboretum are variable in growth and vigour. It will be necessary to replace some, affected by disease. The pine forest has been replanted, and all but a few trees have made good growth.

Cannery and Food Technology.—In the Food Technology course there are fifteen students.

Emphasis in the processing operations has been on instruction to familiarise the students with as many products as possible. This year over eighty different products were handled by the students.

Vegetables processed included 13,000 lb. of canned, 3,500 lb. of quick frozen as well as 340 lb. of dehydrated packs. Types of vegetables processed included asparagus, beans, carrots, cauliflowers, beetroot, peas, tomatoes, sweet corn and mushrooms. Other vegetable products included 460 pints of tomato sauce and 300 cans (16 oz.) of soup. Fruit processed totalled 24,000 lb. of pulp and canned packs, as well as 115 lb. of dried fruit. Apricots, apples, grapefruit, grapes, lemons, oranges, peaches, pears, pineapples, plums and prunes were the fruits treated. 1,115 fowls were quick frozen.

School of Dairy Technology.—Satisfactory operation of the school continued, and despite dry weather periods sufficient milk was received to provide for adequate instruction.

There were considerable increases in the amount of cheese manufactured, surplus milk received, milk pasteurised, ice cream manufactured and milk dried. Due to smaller quantities of cream being supplied there was a considerable fall in the amount of butter produced.

Fourteen students completed the diploma course in 1957, among whom were seven under the Apprenticeship Scheme. Seventeen students entered the first year of the course in 1958, and there are now thirteen students, of a total of thirty-three, studying under the Apprentice Scheme.

Further, minor installation work was carried out. The minor installations and in some cases slight alteration of plant are not yet complete as, in the light of experience and development in the industry, the plant and equipment must be kept up to date.

Second year students again completed in the annual grading competition conducted by the Dairy Factory Managers and Secretaries Association, with considerable success. First year students attended a Dairy Science School at Grafton and all obtained the certificates required by the Dairy Industry Act.

Survey of Milking Machine Efficiency.—This was expanded to cover the southern portion of the state. A coding system for the data obtained has been prepared, and data from approximately 650 machines are now almost ready for entering on the punch card machine.

Air Flow Meter Testing Laboratory.—This has been established and testing of meters has commenced.

Dairy Research Programme.—A programme of research into the effect of modern detergents on the tinning of milking machines and the effects of the consequent exposure of copper and brass on milk quality has been commenced.

Poultry Section.—At 30th June, 1958, the stock totalled 1,992, and egg production 29,472 dozen.

Breeding operations were carried out with White Leghorns, Australorps, turkeys, ducks and geese.

Improvement work with White Leghorns and Australorps is being carried out in conformity with the requirements of the Poultry Improvement Plan (Eggs).

The College flock has again been listed under Class 1 Pullorum-free of the Accredited Pullorum-tested Flock Scheme.

The Section being the Official Testing Station for the Accreditation of Breeders' Flock under the Poultry Improvement Plan (Eggs), pullets for testing have been received from 18 breeders. The entries comprise 11 groups of White Leghorns, 5 groups of Australorps and one group each of Rhode Island Reds and Langshans. The pullets were received in August, 1957. The test extends over a period of 500 days.

A hot water brooder of 2,400 chick capacity has been installed in No. 2 Brooder. This will provide the additional rearing accommodation required to cope with increased entries in the Random Sample Test. A 4-deck weaner battery was received during the year as a gift.

The fifty-seventh Egg Laying Competition commenced on 1st April, 1958, and the sixth Random Sample Test in August, 1957.

A Winter School in Poultry Farming for Junior Farmers was conducted, as well as the Annual Poultry Field Day.

Sheep and Wool Section.—The stock is comprised of a Romney Marsh stud (96 head); ration sheep; and a commercial flock (899, including 60 rams). Lambing in the commercial flock of Dorset Horn and Southdown cross groups was 100 per cent, but was only 80 per cent. in the Border Leicester x Merino cross group.

Diploma Day.—On Diploma Day, 2nd May, 1958, a record crowd of more than 500 witnessed the presentation of Diplomas and Prizes to successful students.

Works and Improvements.—This year marked the greatest material advance in major improvements since the inception of the College.

The Graham Block and other domestic extensions were completed and occupied. All possible remaining cottages were connected to the new sewerage treatment works. Considerable re-landscaping work was achieved in the area of the main buildings, despite very unfavourable weather conditions. The College drive was sealed between the two main entrances, approximately two miles. Kerbing and guttering, 1,300 feet, of the main quarters area was completed. Extensive areas of new lawn were established. Each entrance to the College was redesigned. The College driveway was completely re-fenced and is being prepared for extensive tree planting.

All buildings of pre-war vintage have been demolished except for one cottage and the handyman's shop. Using materials salvaged and some new materials, a further machinery shed (80 ft. x 20 ft.), a blacksmith's shop and a large storage barn (80 ft. x 30 ft.) were erected by farm labour. Two older cottages and certain parts of the quarters were extensively renovated. One new cottage and a new dairy building were commenced. A permanent tuckshop and an extra lecture room were set up in the former administrative building.

Arrears of building maintenance were largely overtaken.

Sectional Operations at Wagga

College Farm.—The 1957 crop yields reflected the adverse season, and at June, 1958, grain and other fodder reserves were at their lowest for many years. Cereal acreage and production in 1957 were: wheat 150 acres, 1,524 bushels; oats, 190 acres, 1,293 bushels; barley, 12 acres, 64 bushels; lucerne hay 12 tons; and cereal crops for grazing, 80 acres.

Eighty-four acres were prepared and made available to the Agricultural Research Institute.

The harsh dry autumn and exceptionally cold early winter made it necessary to cull and sell, or seek agistment for as many head of stock as possible. Only two dams became totally dried out but it was necessary to resort to water carting as a temporary expedient for some of the larger stock.

New lucerne sown was only 15 acres. This brought the total area to 194 acres, of which 167 acres were topdressed with one cwt. superphosphate per acre.

Total area of sown pastures was again reduced, from 973 to 870 acres, of which 610 acres were topdressed with 1 cwt. superphosphate per acre. The acreage reduction was necessary because increased areas are needed for cropping in 1958, to build up grain and fodder reserves.

Ninety-six chains of fencing were replaced and 46 chains of new subdivision fencing were erected.

Major new plant items acquired were a rotary mower, a post hole digger, rotary slasher, power hacksaw, roller, tipping trailer, an off-set disc and a pipe bender. One new item of loan equipment was received, viz. a hammer mill from Dangar Gedye & Malloch Pty. Ltd.

Agronomy Section.—Three experiments in progress in this section are:—

- (i) *The Lucerne Establishment and First Year Management trials* comparing lime pelleted seed and plain seed as well as checking the use of molybdenum and *Rhizobium*.
- (ii) *A Lucerne Renovation and Topdressing trial* which compares the use of different implements for renovating lucerne, and different application rates of superphosphate.
- (iii) *A Soil Tillage trial* in co-operation with the University of Technology to compare the effect of different ploughs on the soil.

In addition, a tree planting programme is being carried out on the College oval and driveways and two student projects are being established, viz., a Pasture Species project and a Pasture Establishment project.

Orchard Section.—Most of the fruit crops were below those of the previous season in quantity and quality. Only 17.62 in. of rain fell over the orchard during the twelve months. Drying,

summer winds reduced greatly the value of such good rains as occurred. The next crop will also suffer, by lack of development of good buds in the dry autumn.

The following quantities of fruit were canned for the College quarters:—7 cwt. of apricots, 2½ cwt. of prunes (wet pack), 13½ cwt. of peaches (ex Yanco), 5 cwt. of pears, and 10 cwt. of apple pulp.

Of the fresh fruit, all that the College kitchen could use within the life of the fruit was supplied. Dried fruit was used up to the limit, and the excess was taken by Hawkesbury College. Almonds in excess of College needs were sold commercially.

There are six main investigations in hand. Further reference to them may occur in the Division of Horticulture section of the report of the Department. Some new varieties have been planted, to observe their behaviour under Wagga conditions.

Practical instruction to students was given in all phases of orchard management, and in harvesting and processing. Considerable improvement has been possible during these twelve months in "tailoring" the orchard to fit the needs of the College course.

Animal Health.—The College stock have been relatively free from disease. Annual tests for tuberculosis in cattle, pigs and poultry yielded negatives except for one Jersey bull which has since been slaughtered. The College poultry flock is now free from Pullorum disease and is listed as "Class I—Pullorum Free" in the Department's Accredited Pullorum-tested Flock Scheme. Neo-natal mortalities in lambs have been very high in recent years and this year a thorough investigation has been conducted; but no one factor has been incriminated as yet. Salmonellosis in pigs has been a problem, and the building of a new piggy in the near future is expected to help the control of this disease.

Dairy Section.—Highlights were the outstanding production of the herd; and the commencement of the new dairy buildings.

Thirty cows completed lactations with an average of over 9,000 lb. milk and 460 lb. butterfat. Several age class leaders for the State were in the herd. Outstanding cows were "Yanco Conquerer's Faithful" and "Yanco Conquerer's Birdseye".

Keen demand persisted for stud bulls and surplus females. Sixteen bulls were sold, at an average of 60 guineas, and seven females at an average of 30 guineas.

Teams were exhibited with success at the Murrumbidgee Pastoral and Agricultural Association Show, Wagga, and the Royal Agricultural Society Show, Sydney. Prize winners at Sydney were mainly confined to Type and Production classes.

Piggery Section.—Pig numbers have been reduced about 10 per cent., owing to feed shortage and a general falling off in demand for stud pigs. Twenty-six stud pigs were sold, including a Berkshire boar and sow exported to Burma and a Tamworth boar supplied to Muresk Agricultural College in Western Australia.

College pigs were again exhibited at the Wagga Show. They gained many prizes, including Berkshire and Tamworth sow and Large White boar championships and Tamworth boar reserve championship.

Two types of watering troughs have been designed and successfully demonstrated at the Piggery section.

Horse Section.—It has been policy to reduce horse numbers as much as possible to permit more of other large stock, particularly beef cattle. In consequence the fifty-seven horses on hand comprise the lowest total for many years.

As the result of the low foaling percentage in 1956, only one Arab colt was sold. This was to a Queensland buyer for 200 guineas.

During the 1957 breeding season, sixty-six privately-owned mares were sent to the two Arab stallions for service. It is intended to discontinue offering the services of the two Arab stallions to privately-owned mares unless these are pure-bred Arabs.

Two strong teams of Arabs were exhibited with success at the 1957 Show at Wagga and the 1958 Royal Show at Sydney. The major awards secured were Champion Arab stallion and Champion Arab mare at Wagga Show; Supreme Champion Arab and Reserve Champion Arab stallion at the Royal Show, Sydney.

The College remains the main source of supply of hacks for other Departmental Farms; and five hacks were transferred for stock work, and five were broken in.

Beef Cattle Section.—The Poll Shorthorn stud is still in its infancy and only a limited amount of culling was carried out. Numbers increased from fifty-four in July, 1957, to eighty-three in June, 1958. Twenty-two heifers were purchased from five well-known studs, to increase the breeding potential of the College stud. Breeding bulls for show and sale still remain the main purposes of the stud.

Two bulls were exhibited at the 1958 Royal Show, Sydney, and were sold for a total of £787 10s.

In respect of grade cattle, a breeding herd of eighteen females is now being maintained, essentially for student instruction but also for the production of ration beef for the College. These cows were joined to calve in the winter of 1958.

A small ration herd, culled from the Poll Shorthorn and Jersey studs, has been maintained for fattening for the beef requirements of the College.

Sheep Section.—The breeding stock have been increased to meet the requirements of ration sheep for College consumption and to provide a better medium for student instruction. However, the dry early autumn of 1958 will necessitate a reduction in the flock.

Overall production for the year has been disappointing. Wool production increased but market conditions resulted in less income than in recent years. Lambing percentage improved slightly but was more than offset by increased losses due to the depredations of crows and foxes.

The College exhibited Dorset Horn and crossbred sheep in the 1957 Wagga Show and gained several prizes in each section. Most successful were the entries in the Riverina and South-west Fat Lamb Carcase Competition, where the College lambs gained two First, one Second and one Third prize from six exhibits.

Students competed with some success in sheep judging competitions at the Wagga Show and the 1958 Sydney Sheep Show.

Poultry Section.—Stock numbers averaged 300 turkeys and 700 fowls. Failure of the harvest led to minor feed supply difficulties.

A start was made to replace all fence posts on the section with steel posts. Two colony yards have been completed. All fences attached to the breeding pens were pulled down and these pens are now being used as intensive pens. A new incubator, 1,000 egg capacity, has been installed for the turkey section. A worn-out brooder was replaced by a new electric brooder.

Apiary Section.—Progress towards establishing the new apiary section has been considerable. Major items of machinery received included a four-frame honey extractor, a 60 lb. uncapping machine, an apiary boiler, an electric motor, and pulleys, belts and sundry fittings. The new honey house is near to completion.

The apiary has been maintained at approximately thirty-five hives. All are in good condition considering the adverse season.

Six imported queens were received in late autumn but due to prevailing conditions only four were successfully introduced to the College hives. The breeding programme during the spring of 1958 will enable the progeny of these queens to be distributed throughout the apiary.

R. J. NOBLE,

Under-Secretary and Director.

18th September, 1958.

Fund Created by the Wheat Marketing (Barring of Claims) Act, No. 22 of 1929 (as amended by Act No. 38 of 1930)

In terms of the Wheat Marketing (Barring of Claims) Act, 1929, all claims against the Government in respect of old Wheat Pools were deemed to be null and void. The State Wheat Office was closed and all assets in the hands of the State Wheat Board were handed over to the Treasury. The Act further provided that after payment of any expenses incurred in concluding the Government wheat marketing operations and meeting certain specific bequests to the University of Sydney and the Trustees appointed under the Farrer Memorial Research Scholarship Fund Act of 1930, the balance remaining in the hands of the Colonial Treasurer was to be invested in Government Stock and that the interest arising therefrom was to be applied to agricultural education and research, in such manner as the Minister for Agriculture may direct. The Act also provided for the capitalisation of any interest unexpended at the end of each year.

The only unrealised asset remaining is a debt by the Roumanian Government covered by bonds to the approximate value of £114,600 of which this State's share is £24,620 (less £1,108 principal repaid). There has been no payment on the bonds since 1931 and the Trustees report that the prospect of any future payment seems to be negligible.

At 30th June, 1958, the Fund had assets amounting to £40,574 12s. 3d., comprising Australian Consolidated Inscribed Stock £39,120; cash in Bank £1,023 15s. 6d.; accrued interest £377 9s. 3d.; and unexpended balance in State Wheat Pools Account £53 7s. 6d. These figures are exclusive of assets in course of realisation.

The sum of £300 was withdrawn from the Fund during the year to meet expenditure under outstanding commitments.

The Revenue Account and Balance Sheet of the Fund for the year ended 30th June, 1958, are shown hereunder:—

REVENUE ACCOUNT FOR THE YEAR ENDED 30TH JUNE, 1958

	£	s.	d.		£	s.	d.
To Balance—Net Surplus Transferred to Accumulated Funds Account	1,393	3	8	By Interest on Investments (Government Securities)	1,361	15	6
				Bank Interest	31	8	2
	£1,393	3	8		£1,393	3	8

BALANCE SHEET AS AT 30TH JUNE, 1958

LIABILITIES				ASSETS			
	£	s.	d.		£	s.	d.
Accumulated Funds as at 1st July, 1957.....	38,228	1	1	Investments in Government Securities (face value)	39,120	0	0
Transfer Unexpended Balance of Com- mitments—30th June, 1957	900	0	0	Balance at Commonwealth Savings Bank	1,023	15	6
Net Surplus for the Year ended 30th June, 1958	1,393	3	8	Interest accrued to 30th June, 1958.....	377	9	3
				Balance State Wheat Pools Account	53	7	6
	2,293	3	8				
	40,521	4	9				
Balance allocated Commitments—30th June, 1957	53	7	6				
	£40,574	12	3		£40,574	12	3

Western Division Public Watering Places Fund

The controlling authorities of Public Watering Places in the Western Division of the State were required by Section 78 (3) of the Pastures Protection Act, No. 35 of 1934, to pay to the Minister not later than 31st January in each year all moneys in their Public Watering Places Funds in excess of the sum of £100. The moneys so paid to the Minister were credited to a Special Deposits Account at the Treasury called the "Western Division Public Watering Places Fund". The moneys so credited were used in the construction or maintenance of tanks, dams and other structures, machinery or works for storing or providing water or otherwise improving Public Watering Places in the Western Division.

The Pastures Protection (Amendment) Act, No. 68 of 1957, provided for the omission of subsection three of section seventy-eight. As this Act was assented to on 9th December, 1957, no payments were made to or from the Western Division Public Watering Places Fund during the year ended 30th June, 1958.

Noxious Insects Destruction Account

Section 10 (1) of the Noxious Insects Act, No. 22 of 1934, provides that such Pastures Protection Boards as are from time to time specified by proclamation published in the Gazette shall in each year make and levy a special rate in the amount prescribed in respect of such year on each owner or occupier of ratable land within the district in respect of large stock and sheep for which he is liable to pay rates under Part II of the Pastures Protection Act, 1912, or under any Act amending or replacing same.

Section 10 (1) of the Act was amended during 1954 by increasing the amount of the special rate which may be levied from one penny to three pence per head in the case of large stock and from one-sixth of a penny to one half-penny in the case of sheep.

The amount received in respect of rates so levied is paid by the Boards to the Minister as a contribution to the cost of suppression and destruction of noxious insects.

All contributions received by the Minister are paid into an account in Special Deposits Account at the Treasury called the "Noxious Insects Destruction Account". Moneys at the credit of such account are applied by the Minister for the purchase of materials for the purpose of the Act and to repay to the Colonial Treasurer any moneys advanced by him.

Receipts and payments for each year since the passing of the Act in 1934 are shown hereunder:—

Financial Year	Receipts from Pastures Protection Boards	Payments
	£ s. d.	£ s. d.
1934-35	925 14 10	10,274 8 8
1935-36	1,712 1 0	731 10 10
1936-37	7,941 2 4	2 4 7
1937-38	8,707 11 11	42,161 1 11
1938-39	27,495 5 3	8,244 8 10
1939-40	17,032 2 6	5,676 16 4
1940-41	7,936 12 5	1,858 5 11
1941-42	1,169 6 3	94 16 0
1942-43	772 4 0	641 10 8
1943-44	221 1 6	1,323 16 0
1944-45	393 15 4	250 5 5
1945-46	40 17 1	48 16 8
1946-47	524 16 2	4,823 2 10
1947-48	1,913 0 6	5,534 18 6
1948-49	11,099 15 2	3,197 6 9
1949-50	664 16 3	616 13 9
1950-51	924 11 0	1,564 4 9
1951-52	46 11 5	128 16 0
1952-53	1 0 0	85 14 5
1953-54	4,404 14 0	128,949 2 7
1954-55	51,588 0 3	176,497 14 8
1955-56	161,994 2 3	52,976 1 4
1956-57	142,947 18 8	25,546 17 9
1957-58	2,082 5 11	1,457 8 0
Grant by Treasury	£452,539 6 0	£472,686 3 2
Less Sales of Materials	75,000 0 0	2,878 7 11
		£469,807 15 3
Balance in Special Deposits Account at 30th June, 1958		57,731 10 9
	£527,539 6 0	£527,539 6 0

The following is a summary of transactions on the Noxious Insects Destruction Account for the financial year 1957-58:—

RECEIPTS	£ s. d.	PAYMENTS	£ s. d.
Balance at 1st July, 1957	56,442 8 8	Travelling Expenses	39 2 4
Levies	2,082 5 11	Maintenance of Vehicles	110 5 5
Sales of Equipment, etc.	664 4 2	Payroll Tax, 1956-57	1 3 11
	2,746 10 1	Equipment Purchases and Repairs	329 1 10
		Rentals, Hiring, etc.	78 0 0
		Freight and Cartage	4 6 9
		Casual Labour	2 10 0
		Share of cost of Patrol Officer	888 0 0
		Supplies	1 11 9
		Advertising	3 6 0
			1,457 8 0
		Balance at 30th June, 1958.....	57,731 10 9
	£59,188 18 9		£59,188 18 9

Pastures Protection Boards of New South Wales—Subsidy to Glenfield Veterinary Research Station

The Council of Advice of the Pastures Protection Boards of New South Wales agreed in 1934 to meet the salaries and travelling expenses of two research officers in veterinary science to be attached to the Glenfield Veterinary Research Station and to defray the cost of such materials and experimental animals as may be agreed upon. The subjects of major research on which officers are to be engaged are decided by the Council on the recommendation of a committee consisting of the Chief, Division of Animal Industry, and the Director of Veterinary Research.

The officer employed on this work in 1955-56 was transferred prior to the end of that year and has not been replaced.

The following is a summary of transactions on the account for the financial year 1957-58:—

RECEIPTS	£ s. d.	PAYMENTS	£ s. d.
Balance at 1st July, 1957	742 0 11	Advertising	33 13 0
Workers' Compensation Insurance Rebate	85 19 7	Workers' Compensation Insurance.....	81 12 2
		Balance at 30th June, 1958.....	712 15 4
	£828 0 6		£828 0 6

Veterinary Surgeons' Act, No. 25 of 1923

The Act provides for the establishment of a Board to be called "Board of Veterinary Surgeons of New South Wales". Fees and payments collected under the Act are paid to the credit of Consolidated Revenue Fund, from which administrative expenses are met. At 30th June, 1958, there were 415 registered Veterinary Surgeons.

Statement of Receipts and Payments for the financial year 1957-58 is:—

RECEIPTS		PAYMENT	
	£ s. d.		£ s. d.
Registration Fees	35 14 0	Salaries	544 14 2
Restoration Fees	15 15 0	Members' Fees	81 18 0
Ret. Fees	824 7 5	Travelling Expenses	8 8 0
Examination Fees	31 10 0	Postage	10 10 2
		Printing	56 12 0
		Sundries	0 4 6
		Examination of Foreign Graduates—	
		Examination Fees	63 0 0
		Travelling Expenses	23 7 4
			86 7 4
			788 14 2
		Excess of Receipts over Payments	118 12 3
	£907 6 5		£907 6 5

Contribution by Milk Board towards Cost of Herd Testing

In 1957, the Chief Veterinary Surgeon of the Department was appointed as Consulting Veterinarian to the Milk Board to supervise and control the testing of cows for tuberculosis and matters associated therewith. The Milk Board agreed to provide £7,250 per annum from 1st July, 1957, to meet the cost of the services to be performed by the Department. This contribution was varied from time to time in accordance with the rise and fall in the actual expenditure. From the financial year 1952-53 the Board agreed to meet the actual cost of T.B. Testing of herds.

The operations on the account for the financial year 1957-58 are shown hereunder:—

RECEIPTS		PAYMENTS	
	£ s. d.		£ s. d.
Contributions by Milk Board—		Balance Payable by Milk Board for 1956-57	1,338 9 1
For—	£ s. d.	Salaries	3,052 6 5
1956-57	1,338 0 1	Employer's Superannuation Contribution	314 3 8
1957-58	4,271 12 10	Workers' Compensation Insurance Premium	58 4 6
	5,610 1 11	Travelling Expenses	895 19 2
Balance Payable by Milk Board	182 19 0	Postage	14 2 6
		Printing	21 1 5
			5,694 6 9
		Payroll Tax	98 14 2
	£5,793 0 11		£5,793 0 11

Potato Growers' Licensing Act

The Potato Growers' Licensing Act, 1946-1952, requires all persons who use an area of land exceeding one acre for the production of potatoes to obtain a licence under the Act. Application for licence or for the renewal of a licence shall be accompanied by the fee. The fee is prescribed by Section 3 (2) of the Act and was increased from 10s. to £1 as from 1st December, 1952.

The licence fees collected and any penalties imposed under the Act are paid into a special account at the Treasury. The Colonial Treasurer shall upon the recommendation of the Minister for Agriculture, pay out of such special account moneys—

(a) to any society registered under the Co-operation Act, 1923-1938, or any other association or body of persons which, at the satisfaction of the Minister, will wholly apply such moneys to the promotion of the production, marketing, treatment and sale of potatoes.

(b) to be used in any other manner which the Minister deems to be best calculated to develop or protect the potato growing industry.

Any moneys so paid shall be expended for such purposes in furtherance of the interests of the potato growers of New South Wales as in any particular case the Minister may approve, or generally as may be prescribed.

The transactions on the Special Deposits Account for the financial year are as follows:—

RECEIPTS		PAYMENTS	
	£ s. d.		£ s. d.
Balance as at 1st July, 1957	578 8 0	Grants to Potato Growers Association	1,550 0 0
Licence Fees	1,659 7 6	Administrative Costs	79 15 0
Fines	41 0 0	Postage	57 15 0
		Stationery	1 4 1
			£1,688 14 1
		Balance at 30th June, 1958	590 1 5
	£2,278 15 6		£2,278 15 6

**Grant by McGarvie Smith Institute towards the Running Expenses of the Nutrition Station
at Shannon Vale**

A Nutrition Research Station was established in 1938 in the New England district for the purpose of carrying out a series of experiments associated with anaemia in sheep. The estimated working costs were £400 per annum, less revenue to be received from the sale of wool. The McGarvie Smith Institute agreed to provide the difference between the amount received from the sale of wool and £400 each year for a term of five years. The first contribution of £200 was received in 1938. In July, 1943, the Institute approved of the continuance of the subsidy for a further period of five years and from 1st January, 1946, the subsidy was increased to £600 per annum, less revenue from the sale of wool. In October, 1948, the Institute agreed that the subsidy would continue for a further period of five years. Since then no subsidy has been required, as receipts from the sale of livestock and wool, etc., have been sufficient to cover running costs.

Grants received from the Institute and the proceeds from the sale of wool are credited to a Special Deposits Account. Transactions on the account for the financial year 1957-58 are shown hereunder:—

RECEIPTS			PAYMENTS		
	£	s. d.		£	s. d.
Balance at 1st July, 1957		2,503 14 2	Wages	1,271 7 6	
Sale of Wool	3,487 11 6		Freight and Cartage	300 9 3	
Agistment Fees	92 4 6		Fertilizers	895 5 3	
Sale of Livestock	181 16 8		General Supplies	347 14 8	
Sale of Skins	10 17 0		Fencing	245 14 7	
Rent of Cottage.....	34 17 8		Mower, stand and stabilizer	140 12 0	
		3,807 7 4	Shearing Machine and Equipment	482 7 3	
			Troughing, Galvanised	117 18 0	
			Water Tanks	66 12 9	
			Plant Repairs	129 1 4	
			Southdown Rams (3)	31 10 0	
			Tractor (Maintenance)	78 11 11	
				4,107 4 6	
			Balance at 30th June, 1958.....	2,203 17 0	
	£6,311 1 6			£6,311 1 6	

Bush Fire Relief

During the summer of 1957-58 there were extensive bush fires on the Blue Mountains, as well as outbreaks in other parts of the State. Payments of relief, as well as emergency costs of clothing, blankets, etc., made from the Commonwealth/State Bush Fire Relief Fund by the Department totalled £37,290.

Flood Relief

As no serious floods occurred during 1957-58, the expenditure of £13,804 covered claims for relief, food, clothing, medical supplies and transport in respect of the previous year.

Commonwealth Dairy Industry Extension Grant

The Commonwealth Government has agreed to the continuance of the grant for a period of five years, ending 30th June, 1963, under the terms and conditions set out in the Department's report for the year ended 30th June, 1953.

The first grant was received in October, 1948, and the expenditure to 30th June, 1958, amounted to £615,332 13s. 1d. under the following headings:—

Item	1948-49 to 1956-57	1957-58	Total
	£ s. d.	£ s. d.	£ s. d.
Organising Officers	96,772 11 8	12,677 15 0	109,450 6 8
General Publicity	49,568 5 5	6,974 11 10	56,542 17 3
Demonstrations	133,119 19 4	10,981 12 11	144,101 12 3
Competitions	7,437 7 4	.....	7,437 7 4
Field Days.....	88 15 7	.....	88 15 7
Herd Recording	140,710 13 6	24,340 18 2	165,051 11 8
Artificial Insemination	60,075 15 3	.....	60,075 15 3
Statistical Work	15,941 7 7	2,092 14 2	18,034 1 9
Herd Surveys	26,165 6 8	.....	26,165 6 8
Punch Card Equipment	10,434 4 7	4,747 8 6	15,181 13 1
Milking Machine Survey	2,127 19 7	5,347 9 0	7,475 8 7
Contribution towards attendance of representative at International Study Centre.....	400 0 0	.....	400 0 0
Contribution towards attendance of representative at Maryland University .....	.....	806 16 3	806 16 3
Insurance of Bulls	1,600 0 0	1,600 0 0 Cr.	.....
Milking Machine Testing Station .....	.....	210 13 8	210 13 8
Survey—Infertility in Dairy Herds .....	.....	310 7 1	310 7 1
Agricultural Trainees .....	.....	4,000 0 0	4,000 0 0
	£544,442 6 6	£70,890 6 7*	£615,332 13 1

*Refund of £1,600 by Milk Board of New South Wales on account of insurance of bulls deducted from expenditure of £72,490 6s. 7d.

The following tabulation shows the various diseases for which cattle were condemned and the amount of compensation paid, together with the particulars of receipts during the year:—

Disease	Claims			Animals			Payments					
	Regulation 5	Regulation 6	Total	Regulation 5	Regulation 6	Total	Regulation 5	Regulation 6	Total			
Blackleg	2,404	2,166	4,570	8,888	3,268	12,156	£ 171,401	s. d. 1 8	£ 56,780	s. d. 7 5	£ 228,181	s. d. 9 1
Brucella	1,518	199	1,717	2,209	218	2,427	28,531	4 5	3,896	1 3	32,427	5 8
Contagious	1,762	25	1,787	2,122	20	2,142	26,702	14 0	315	5 7	27,017	19 7
Foot-and-mouth	74	2	76	81	2	83	624	9 8	19	12 2	643	11 10
Haemorrhagic	47	...	47	161	...	161	2,138	8 1	...	...	2,138	8 1
Peritonitis	80	...	80	47	...	47	751	15 5	...	...	751	15 5
Septicemia	12	...	12	38	...	38	654	15 4	...	...	654	15 4
Other diseases	2	...	2	2	...	2	49	0 0	...	...	49	0 0
Total	5,840	2,392	8,232	16,508	3,514	20,022	£281,158	8 7	£60,961	6 5	£342,119	15 0
Refunds and Recoveries											55	1 2
											£292,059	13 10

SUMMARY OF RECEIPTS AND PAYMENTS

	£	s.	d.
Balance brought forward at 1st July, 1957	..	..	..
Add Receipts—	£	s.	d.
Levy	..	..	..
Sale of Stamps	..	..	..
	214,936	16	2
	90,340	2	4
	305,276	18	6
Less Payments—			
Compensation	292,059	13	10
Independent Valuers	12	12	0
Administration charge based on 5 per cent. of the total paid to the credit of the Fund during 1956-57 (£18,274 6s. 9d.)	9,363	14	4
	301,436	0	2
	£12,998	8	7

NOTES

	£	s.	d.
(a) Balance at 1st July, 1957, as stated	..	..	..
Loan from Treasury	..	..	..
	15,000	0	0
Balance as shown in report for 1956-57	£24,157	10	3

(b) £1,000 per annum to Pasture Protection Boards for additional remuneration to Secretaries and £7,231 0s. 10d. paid to Consolidated Revenue to cover costs of Department of Agriculture.

(c) Amount of £50,000 advances by the State Treasury is held in the Fund in addition to the balance shown to cover any temporary excess of payments over receipts. This sum has been excluded from the balance in order that the true position of the Fund may be shown.

Country Killing Centres

The capital expenditure incurred by the Government on the erection of Country Killing Centres to 30th June, 1958, was as follows:—

	£	s.	d.
Goulburn	419,063	12	6
Wagga	410,061	3	4
Dubbo	464,607	0	1
Gunnedah	496,846	1	7

[illegible]

Division	Particulars	Designs (Cases)	Revenues (Amount)	Net Receipts			
		\$	¢	\$	¢	\$	¢
Central Administration	Fees—Farm Product Agency Act, 1914-15	145	2 00			145	2 00
	Fees—Permits Act, 1914	145	4 00	4	4 00	145	4 00
	Fees—Appl. Registrations	2,004	4 00	80	4 00	1,924	4 00
	Fees—Seed Registrations Act, 1914	145	4 00	4	4 00	145	4 00
	Fees—Registration of Seed Plants	1,134	4 00	45	4 00	1,089	4 00
	Fees—Registration of Seed Plants	145	4 00	45	4 00	145	4 00
	Fees—Seed Plants and Mixtures Act, 1914	1,134	4 00	45	4 00	1,089	4 00
	Fees—Seed Plants and Mixtures Act, 1914	145	4 00	45	4 00	145	4 00
	Fees—Seed Plants and Mixtures Act, 1914	10	4 00			10	4 00
	Fees—Adapts	145	4 00			145	4 00
	Fees—Flora Certificates	145	4 00			145	4 00
	Fees and Permits	145	4 00			145	4 00
	Purchase of Seed	2,004	4 00	145	4 00	1,859	4 00
	Commission for collection of Premiums—Grain Insurance Scheme	145	4 00			145	4 00
	Commission for collection of Contributions—National Hospital and Medical Benefit Fund	145	4 00			145	4 00
	Commission for collection of Contributions—National Hospital and Medical Benefit Fund	145	4 00			145	4 00
	Commission for collection of Contributions—National Hospital and Medical Benefit Fund	145	4 00			145	4 00
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Commission for collection of Contributions—National Hospital and Medical Benefit Fund	145	4 00			145	4 00	
Commission for collection of Contributions—National Hospital and Medical Benefit Fund</							

OTHER ACCOUNTS

Name of Account	Balance as at 1st July, 1957	Receipts 1957-58	Payments 1957-58	Balance as at 30th June, 1958
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Advances to Officers for Purchase of Motor Cars	Dr. 93,476 13 4	33,014 11 6	37,463 7 9	Dr. 97,925 9 7
Contribution towards Running Expenses of Tractor Mower at Centennial Park	346 18 3	143 6 8	131 17 11	358 7 0*
Potato Growers' Licensing Act, 1940	578 8 0	1,704 7 6	1,692 14 1	590 1 5*
Balance of Salaries Adjustment Suspense Account	43,439 6 1	57,528 0 4	43,439 6 1	57,528 0 4*
Government Printing Office—Working Account and Stores Account and Sale of Publications .....	.....	638 10 2	37 19 11	600 10 3*
Noxious Insects Destruction Account	56,442 8 8	2,746 17 1	1,457 15 0	57,731 10 9*
Swine Compensation Fund	55,060 4 2	59,622 16 7	22,310 19 7	92,372 1 2*
Hawkesbury Agricultural College Canning Factory Account	207 6 1	1,357 17 4	1,089 17 0	475 6 5*
Hawkesbury Agricultural College—Dairying Factory Working Account	5,203 17 10	115,772 5 6	103,578 8 0	17,397 15 4*
Tobacco Industry Trust Account	10,260 12 9	8,000 0 0	7,751 11 2	10,509 1 7*
Commonwealth-State Bush Fire Relief Scheme .....	.....	50,000 0 0	37,289 11 5	12,710 8 7*
Advances to be Recovered Account .....	.....	.....	2,969 1 9	Dr. 2,969 1 9*
Unclaimed Moneys Account	763 15 0	633 16 3	345 8 4	1,052 2 11*
Rural Training of Ex-Servicemen	346 15 2	157 2 0	503 17 2	0 0*
Commonwealth Grant towards the Promotion of Improved Practices in the Dairying Industry	16,112 12 11	63,319 4 4	72,567 15 9	6,864 1 6*
Argentine Ant Eradication Campaign	1,939 19 5	12,094 14 8	13,143 17 3	890 16 10*
Commonwealth Grant—Expansion of Agricultural Advisory Services—New South Wales	4,857 17 0	79,727 12 6	71,971 17 7	12,613 11 11*
Cattle Compensation Fund	24,157 10 3	355,538 19 5	316,698 1 1	62,998 8 7*
Flood Relief Scheme, 1955	19,493 9 3	809 4 11	13,804 3 9	6,498 10 5*
V. P. Bragg Scholarship—Wagga Agricultural College .....	.....	3,137 0 4	30,39 8 3	97 12 1*
V. P. Bragg Scholarship Account (Investment) .....	.....	6,000 0 0	.....	6,000 0 0
Hawkesbury Agricultural College Trust Account	1,478 12 7	8,458 10 5	5,259 19 4	4,677 3 8*
Wagga Agricultural College Trust Account	1,180 1 5	1,882 16 6	1,133 3 0	1,929 14 11*
Advertising—Department of Agriculture Publications Account...	1,195 8 3	11,926 0 0	11,605 12 3	1,515 16 0*
Attendance at International Agricultural Study Centre, Wageningen, Holland—H. Parry Brown	635 7 0	130 17 9	766 4 9	0 0*
Bequest from Estate of Emanuel Haropoulous for the purpose of Agricultural Research	270 2 8	.....	254 16 11	15 5 9*
Trust Fund—Brown Rot Investigations .....	.....	2,716 0 0	2,199 12 8	516 7 4*
Chicken Sexing—Purchase of Chickens .....	.....	40 10 0	40 10 0	0 0*
Commonwealth Bank (Rural Credits Development Fund) Grant towards Erection of Glasshouse, Hawkesbury Agricultural College	2 7 4	.....	.....	2 7 4*
Contribution by Commonwealth towards cost of investigations into excess spray residue on fruit .....	.....	2,950 0 0	422 6 3	2,527 13 9*
Commonwealth Contribution towards cost of Dr. L. Fraser's Trip to United States of America .....	.....	1,000 0 0	1,000 0 0	0 0*
Contribution by C.S.I.R.O. towards Construction of Animal House at Trangie	5,500 0 0	820 0 0	6,320 0 0	0 0*
Contribution by C.S.I.R.O. towards Eco-Parasite Survey	275 10 9	587 0 5	862 11 2	0 0*
Contribution by C.S.I.R.O. towards Fleece Testing work at Trangie	1,000 0 0	160 0 0	820 0 0	340 0 0*
Contribution by C.S.I.R.O. towards Cost of Research into Metabolic Diseases of Sheep and Endocrinology—Glenfield Veterinary Research Station .....	.....	721 10 6	721 10 6	0 0*
Contribution by Council of Advice to Pastures Protection Boards towards cost of attendance by Mr. E. McBarron at Grasslands Conference, New Zealand	30 8 9	.....	20 1 0	10 7 9*
Contribution by Department of Commerce and Agriculture towards Development of Auto-Stripper	482 11 4	367 8 8	.....	850 0 0*
Contribution by Legume Inoculant Association towards Research and Service in the Field of Rhizobiology	81 4 0	.....	60 11 0	20 13 0*
Contributions by States towards Salary and Expenses of Patrol Officer, Grasshopper Control	3,332 17 0	2,220 0 0	1,640 8 4	3,912 8 8*
Contributions for Plague Locust Trial Control Campaign	20,477 5 5	9,858 16 10	6,723 8 6	23,612 13 9*
Contribution towards Animal Insect Pest Investigations— Glenfield Veterinary Research Station	550 0 0	200 0 0	12 4 7	737 15 5*
Contribution towards cost of attendance of Departmental Delegates to New Zealand Grasslands Conference	7 18 7	.....	7 18 7	0 0*
Contributions towards cost of Miss A. Myers' trip abroad, 1956...	71 9 5	.....	.....	71 9 5*
Contribution toward cost of Overseas Trip—Dr. A. T. Pugsley...	.....	1,650 0 0	101 3 3	1,548 16 9*
Contributions towards Establishment of Library at Agricultural Research Institute, Wagga	45 9 7	.....	.....	45 9 7*
Department of Agriculture Suspense Account	4,568 16 5	8,264 6 4	11,454 19 5	1,378 3 4*
Department of Agriculture Honour Roll Account .....	.....	43 16 0	.....	43 16 0*
Donation by I.C.I.A.N.Z. towards Pasture Fertilizer Nitrogen Investigations	1,178 2 5	1,500 0 0	1,599 16 9	1,078 5 8*
Fire Damage Account	1,422 14 4	463 13 6	1,231 19 8	654 8 2*
Hawkesbury Agricultural College Egg Laying Competition Prize Fund	456 11 10	289 19 6	206 8 5	570 2 11*
Horse Breeding Fund	142 18 10	.....	.....	142 18 10*
I.C.I.A.N.Z. Scholarship in Animal Husbandry, Wagga Agricultural College .....	.....	100 0 0	100 0 0	0 0*
McGarvie Smith Institute—Contribution towards Running Ex- penses of Nutritional Station at Glen Innes	2,503 14 2	3,807 7 4	4,107 4 6	2,203 17 0*
McGarvie Smith Institute—Contribution to Nutritional Research Laboratory, Glenfield	686 19 7	.....	.....	686 19 7*
Pastures Protection Boards of New South Wales—Subsidy to Glenfield Veterinary Research Station	742 0 11	85 19 7	115 5 2	712 15 4*
W. S. Pender Memorial Fund—Interest on Bonds	204 5 3	31 5 0	23 2 6	212 7 9*
Rice Research Laboratory, Yanco	106 14 8	3,896 0 0	106 14 8	3,896 0 0*
Sale of Book "Farm Management and Elementary Agricultural Economics"	8 11	.....	.....	8 11*
Sale of Rural Training Booklets—Wagga	1 19 7	7 8 8	.....	9 8 3*

OTHER ACCOUNTS—continued

Name of Account	Balance as at 1st July, 1957	Receipts 1957-58	Payments 1957-58	Balance as at 30th June, 1958
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Sale of Photographic Prints	4 1 4	26 0 0	28 7 0	1 14 4*
Stamp Duty on Agreement—Wheat Stacking Sites	15 0	.....	.....	15 0*
State Wheat Pools Account (Payment of Dr. Noble's Expenses of Overseas Trip).....	.....	300 0 0	246 12 6	53 7 6*
Tropical Fruit Research Station	5,000 0 0	.....	.....	5,000 0 0*
Unclaimed Salaries and Wages	733 9 3	1,112 2 10	1,491 12 11	353 19 2*
Winter School for D.D. Holders—Entertainment.....	.....	9 16 6	.....	9 16 6*
Totals	£ 200,134 14 1	917,573 13 5	811,971 4 5	305,737 3 1

APPENDIX II

Published Matter*, 1957-58

* Viz: Matter printed as Department of Agriculture (D. of A.) booklets, or contributed to and printed as articles in Department of Agriculture journals (the monthly Agricultural Gazette of N.S.W., the quarterly Review of Marketing and Agricultural Economics, the bi-monthly Dairy Topics) or the journals of other institutions/organisations.

The Appendix does not list the many times greater volume of items contributed, in the course of extension service, to such media as the Department's weekly printed broadsheet, Press Copy, and regional publicity bulletins (processed), for syndication to newspapers and radio stations. A statistical account of that published matter is included in this report under "Division of Information Services—Editorial Section" and "Regional Extension Services—Regional Publicity".

A. DIVISION OF PLANT INDUSTRY

D. of A. Booklets

- Anon.—Growing Green Peas. 8 pp., ill.
- Anon.—Home Production of Vegetables. 10 pp.
- Anon.—Lupins. (Roneo.)
- Autry-Hall, F.—Pastures for Young District. (Revised.) 58 pp., ill.
- Bowmaker, E. W.—Irrigation Farming. (Revised.) 72 pp., ill.
- Boyle, J. W.—Pastures for Metropolitan, Gosford, Camden Districts. (Revised.) 46 pp., ill.
- Brown, C. Walkden.—Oat Varieties for 1958. 7 pp., ill.
- Brown, C. Walkden.—Wheat Varieties for 1958. 12 pp., ill.
- Flynn, R. J.—Pastures for Grafton District. (Revised.) 63 pp., ill.
- Godden, G. R.—Fodder Crops; Albury-Holbrook District. (Revised.) 11 pp., ill.
- Johnson, R. I.—Pastures for Junee District. (Revised.) 45 pp., ill.
- Kavanagh, L. R.—Which Hybrid Should I Sow? (Revised.) 9 pp., ill.
- Noonan, J. B.—Turnips and Swedes for Fodder. (Revised.) 10 pp., ill.
- O'Reilly, J. A.—Pastures for Gunnedah District. (Revised.) 56 pp., ill.
- Spencer, R. T.—Report on Investigations of Vegetable Growing in Union of South Africa and Great Britain. 11 pp., ill.
- Thomson, R.—Pastures for Goulburn District. (Revised.) 41 pp., ill.
- Tickner, N. S.—Pastures for Dubbo District. (Revised.) 101 pp., ill.
- Waring, E. J.—Pastures for Murwillumbah District. (Revised.) 75 pp., ill.
- Woodward, H. A. W.—Pastures for Parkes District. (Revised.) 37 pp., ill.
- York, F. A.—Pastures for Glen Innes District. (Revised.) 43 pp., ill.
- Anon.—Growing Green Peas in New South Wales. Agric. Gaz. N.S.W. 69: 233-37.
- Anon.—Oat Trials. Agric. Gaz. N.S.W. 68: 443.
- Anon.—Root Crop Seed Production. Agric. Gaz. N.S.W. 68: 360-4.
- Anon.—Sowing and Planting Guide for Vegetables. Agric. Gaz. N.S.W. 68: 635-8.
- Anon.—Summer in the Flower Garden. Agric. Gaz. N.S.W. 68: 631-4.
- Anon.—Value of Sulphur on Pasture. Agric. Gaz. N.S.W. 68: 460.
- Brown, C. Walkden.—Oat Varieties for 1958. Agric. Gaz. N.S.W. 69: 2-8.
- Brown, C. Walkden.—Wheat Varieties for 1958. Agric. Gaz. N.S.W. 69: 57-68.
- Dann, P. R.—Pasture Species for the South-West. Agric. Gaz. N.S.W. 68: 618-23.
- Dann, P. R.—Rotary Sod-seeding of Permanent Irrigated Pasture. Agric. Gaz. N.S.W. 68: 394-6.
- Darley, E. C.—Soil Blocks for Vegetable Seedlings. Agric. Gaz. N.S.W. 68: 407-9.
- Jessup, R. J.—Potato Breeding in New South Wales. J. Aust. Inst. Agric. Sci. 24: 121-6.
- Jessup, R. J.—Potatoes and Soil Fertility. Agric. Gaz. N.S.W. 69: 99-101.
- Jessup, R. J.—Potato Sett Spacing Trial. Agric. Gaz. N.S.W. 69: 304-6.
- Kavanagh, L. R.—Cultivation of Cowpeas. Agric. Gaz. N.S.W. 69: 79-82. 92.
- Kavanagh, L. R.—The Sowing of Hybrid Maize. Agric. Gaz. N.S.W. 69: 316-23.
- Kavanagh, L. R.—Which Hybrid Should I sow? Agric. Gaz. N.S.W. 68: 344-52.
- Matheson, E. M.—The Quest for an Australian Winter Wheat. Agric. Gaz. N.S.W. 68: 506-8.
- Myers, Amy.—Testing Maize for Germination with Tetrazolium Salts. Agric. Gaz. N.S.W. 69: 243.
- O'Reilly, J. A.—A Place for Winter Wheats in the North-West. Agric. Gaz. N.S.W. 68: 509-11.
- Orman, A. C.—Trends in the Production of Vegetables for Processing. Food Technology in Australia. 9: 9.471-77.
- Simmons, K. V.—Grain Sorghum Investigations at Yanco Experiment Farm. Agric. Gaz. N.S.W. 69: 225-32.
- Simmons, K. V. and Hood, C. R.—Sweet Corn Growing on the M.I.A. Agric. Gaz. N.S.W. 68: 453-60.
- Squire, M. J. E.—Temperatures in Silage Making. Agric. Gaz. N.S.W. 68: 541.
- Strang, J. and Broue, P.—Urea for High Quality Rye Grass Hay. Agric. Gaz. N.S.W. 69: 122-8.
- Waring, E. J.—Plastic Tubing for Irrigation. Agric. Gaz. N.S.W. 69: 28.

Contributions to Journals

- Anon.—For Spring Growing of Vegetables. Agric. Gaz. N.S.W. 68: 461-70.
- Anon.—For Summer Sowing of Vegetables. Agric. Gaz. N.S.W. 68: 628-31.
- Anon.—Green Feed for Poultry. Agric. Gaz. N.S.W. 68: 660-4.
- Anon.—Growing Celery in New South Wales. Agric. Gaz. N.S.W. 68: 567-72.

B. DIVISION OF HORTICULTURE

D. of A. Booklets

- Anon.—Cross Pollination of Fruit Trees. (Revised.) 6 pp., ill.
- Anon.—Home Orchard Calendar. (Revised.) 28 pp., ill.
- Anon.—Marketing Perishable Vegetables. (Revised.) 32 pp., ill.
- Bowman, F. T.—Horticultural Research Record. No. 2. 59 pp.
- Bryden, J. D.—Peach Growing. (Revised.) 14 pp., ill.
- Bryden, J. D. and Levitt, E. C.—Pruning Fruit Trees. (Revised.) 16 pp., ill.
- Bryden, J. D.—Trailing Berries, and Bush Fruits. (Revised.) 11 pp., ill.
- Cann, H. J. and Eady, C. A.—Destroying Bananas by Hormones. 4 pp., ill.
- Hornes, J. C.—Packing of Bananas. (Revised.) 18 pp., ill.
- Davidson, J. R.—Prevention of Frost Damage in Orchards and Vineyards. (Revised.) 16 pp., ill.
- Eastwood, H. W. and Kebby, R. G.—The Macadamia Nut. (Revised.) 10 pp., ill.
- Gosford Citrus Wastage Research Laboratory.—Curing or Storing of Lemons. (Roneo.) 2 pp.
- Kebby, R. G.—Pineapple Growing. (Revised.) 20 pp., ill.
- Levitt, E. C.—Citrus Culture. (Revised.) 72 pp., ill.
- Levitt, E. C.—Heavy "Drop" of Citrus Fruit. (Revised.) 6 pp., ill.

Contributions to Journals

- Bowman, F. T.—Chemical Thinning Improves Off-year Apple Cropping. Agric. Gaz. N.S.W. 68: 644-5.
- Cann, H. J. and Eady, C. A.—Destroying Bananas by Hormones. Agric. Gaz. N.S.W. 69: 69-75, 443.
- Cox, J. E.—Flowering and Pollination of Passionfruit. Agric. Gaz. N.S.W. 68: 573-6.
- Eastwood, H. W. and Kebby, R. G.—The Macadamia Nut. Agric. Gaz. N.S.W. 69: 69-75, 92.
- Gregory, G. R.—Wine Grape Growing in the Hunter Valley. Agric. Gaz. N.S.W. 69: 281-91.
- Leigh, D. S. and Hutton, K. E.—Dothiorella Canker and Dieback of Apple Trees. Agric. Gaz. N.S.W. 69: 192-5. See also Biological Branch, Hutton, K. E.
- Levitt, E. C.—Planting of Citrus Trees. Agric. Gaz. N.S.W. 69: 14-7.
- Scott, K. J. and Hall, E. G.—Ripening of the Honeydew Melon. Food Preservation Quarterly. 18: 32-4.

C. DIVISION OF ANIMAL INDUSTRY

D. of A. Booklets

- Anon.—Bovine Trichomoniasis. (Reprint.) 3 pp.
- Anon.—Breeding Pigs for Profit. (Revised.) 19 pp., ill.
- Anon.—Breeding Table for all Classes of Stock, A. (Revised.) 1 p.
- Anon.—Brucellosis of Cattle. (Revised.) 10 pp.
- Anon.—Castration of Pigs. (Revised.) 6 pp., ill.
- Anon.—Contagious Pleuro-pneumonia of Cattle. (Revised.) 4 pp. (Roneo.)
- Anon.—How to Tell the Age of Sheep. (Revised.) 3 pp., ill.
- Anon.—Lameness in Lambs. (Revised.) 3 pp.
- Anon.—Lice and Mange Infestation of Pigs. (Revised.) 4 pp., ill.
- Anon.—Suppurative Otitis in Pigs. (Revised.) 2 pp.
- Anon.—Ulcerative Granuloma of Pigs. (Revised.) 4 pp.
- Brann, V. H. and Wilkins, S. J.—Housing Poultry. (Revised.) 72 pp., ill.
- Carse, G. M. D.—Bacon Curing on the Farm. (Revised.) 4 pp.
- Carse, G. M. D. and Mylrea, P. J.—Feeding Pigs for Profit. (Revised.) 32 pp.
- Carse, G. M. D. and Craig, R. B.—Ruakura Round Farrowing House. (Revised.) 5 pp., ill.

- Gulliford, J. H.—Brooding and Rearing Chickens. 24 pp., ill.
- Harris, A. N. A. and Cantrill, A. K.—Lamb Marking. (Revised.) 7 pp., ill.
- Hawkins, C. J. and Beveridge, L. H.—Preparing Sheep for Exhibition. (Revised.) 9 pp., ill.
- McClymont, G. L.—Hand Feeding of Sheep. 32 pp., ill.
- McClymont, G. L. and McDonald, M. W.—Scientific Poultry Feeding. (Revised.) 52 pp., ill.
- Morley, F. H. W.—Genetic Improvement of Australian Merino Sheep. (Revised.) 33 pp., ill.
- Shelley, R. W.—Temporary Straw Shelters for Pigs. (Revised.) 6 pp., ill.
- Smith, J. P. C.—Culling Poultry. 16 pp., ill.
- Smith, J. P. C.—Incubation. 26 pp., ill.
- Smith, G. W., Christie, D. G., Pearson, I. G. and McClymont, G. L.—Turkey Raising. (Revised.) 58 pp., ill.
- Steel, N. A.—Care and Management of Brood Sows. (Revised.) 8 pp., ill.
- Wilkins, S. J. and Pearson, I. G.—Duck Raising. 27 pp., ill.
- Wood, J. N.—Shelter for Sheep. (Revised.) 3 pp., ill.

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- Anon.—Dehorning of Cattle. Agric. Gaz. N.S.W. 69: 186-91, 219.
- Anon.—Entero-toxaemia. Agric. Gaz. N.S.W. 69: 151-5.
- Anon.—Prevention and Treatment of Tetanus in Stock. Agric. Gaz. N.S.W. 68: 588-9.
- Anon.—Suppurative Otitis in Pigs. Agric. Gaz. N.S.W. 68: 353, 388.
- Anon.—Testing Rams by Their Progeny. Agric. Gaz. N.S.W. 68: 420-7.
- Anon.—Treatment for Lice Infestation of Sheep. Agric. Gaz. N.S.W. 68: 526-34.
- Benecke, F. S.—Rearing of Queen Bees. Agric. Gaz. of N.S.W. 68: 477-80, 500.
- Brann, V. H. and Wilkins, S. J.—Control of Feather Picking. Poultry Notes, Nov., 1957.
- Brann, V. H. and Wilkins, S. J.—Egg Shell Quality. Poultry Notes, Nov., 1957.
- Brann, V. H.—Green Feed for Poultry. Poultry Notes, Aug., 1957.
- Brann, V. H.—Main Breeds of Poultry. Poultry Notes, Sept., 1957, Oct., 1957.
- Brann, V. H.—Prospects for Autumn Hatching. Poultry Notes, Jan., 1958.
- Brann, V. H.—Raising Geese. Poultry Notes, July, 1957. 68: 626-7. 651.
- Carse, G. M. D.—Feeding Orphan Pigs. Agric. Gaz. N.S.W. 68: 626-7. 651.
- Carse, G. M. D.—The Pig Industry. Land Annual, 1957.
- Cotsell, J. C.—Sheep Management and Pasture Use. Agric. Gaz. N.S.W. 69: 169-77. See also Glenfield Vet. Res. Stn., Cotsell, J. C.
- Doyle, T. J.—Management of the Laying Stock. Agric. Gaz. N.S.W. 69: 43-6.
- Gulliford, J. H.—Fifth Random Sample Test at Hawkesbury Agricultural College. Poultry Notes, May, 1958.
- Gulliford, J. H.—Random Sample Test with Pullets. Poultry Notes, March, 1958.
- Hawkins, C. J. and Luff, A. F.—General Purpose Sheep Yards. Agric. Gaz. N.S.W. 69: 296-8.
- May, E. S.—The Australian Merino. Agric. Gaz. N.S.W. 69: 9-13.
- Pearson, I. G.—Omphalitis Naval Infection of Chickens. Agric. Gaz. N.S.W. 69: 263-4.
- Simpson, G. H.—Pig Raising in the South and South-west of New South Wales. Agric. Gaz. N.S.W. 69: 129-32.
- Smith, J. P. C.—The Artificial Hatching of Eggs. Agric. Gaz. N.S.W. 68: 413-9, 443, 484-8, 500, 545-50.
- Smith, J. P. C.—Poultry Productivity in Relation to Environment. Poultry Notes, Feb., 1958.
- Smith, J. P. C.—The Social Order in Poultry. Poultry Notes, Dec., 1957.
- Steel, N. A.—Identification of Pigs. Agric. Gaz. N.S.W. 68: 652-6, 669.
- Wilkins, S. J.—Culling Systems for Cage Layers. Poultry Notes, June, 1958.

D. DIVISION OF DAIRYING

D. of A. Booklets

Anon.—Recording of Pure Bred Registered Cattle No. 20.

Contributions to Journals

Anon.—Department's Dairy Cattle Successful at Royal Show. *Agric. Gaz. N.S.W.* 69: 292-5.

Anon.—Herd Recorder Devises Ingenious Equipment. *Dairy Topics*. 2:6 3-6.

Anon.—Milton Dairy Farmer Praises Herd Recording. *Dairy Topics*. 2: 5 7-9.

Anon.—The Dairying Industry. *Land Annual*, 1957.

Barnett, L. G.—Getting Started in Dairying and Dairy Topics. 3: 2 3-6.

Barnett, L. G.—Tame Your Heifers Before They Calve. *Dairy Topics*. 3:2 10.

Calder, B. O. E.—Efficiency Must Be Improved. *Agric. Gaz. N.S.W.* 69: 76-8, *Dairy Topics*. 2:6 7-8.

Calder, B. O. E.—Herringbone Milking Sheds could Boost Dairy Efficiency. *Dairy Topics*. 3:1 7-13.

Irvine, R. G.—No "Passengers" on this Farm. *Agric. Gaz. N.S.W.* 69: 84-92.

Irvine, R. G.—Worthless Bracken Land Now Productive Pasture. *Dairy Topics*. 3:2 15-16.

Richardson, A. O.—Clamp Silo Answers Many Storage Problems. *Dairy Topics* 2:6 12-13.

Scott, D. R.—Wakool Farm is Pattern for Success. *Dairy Topics*. 2:4 3-6.

Scott, I. W.—Are Horns Necessary On Ayreshires? *Agric. Gaz. N.S.W.* 69: 118-21.

Scott, I. W.—Bi-monthly Herd Recording. *Dairy Topics*. 3:2 19.

Scott, I. W.—Breeding for Milk Production. *Agric. Gaz. N.S.W.* 68: 512-7, 561-6.

Scott, I. W.—Feeding Rack Reduces Waste. *Agric. Gaz. N.S.W.* 68: 498.

Scott, I. W.—Group Herd Recording 1955-6. *Dairy Topics*. 2:4 7-20.

Scott, I. W.—Group Herd Recording 1956-7. *Dairy Topics*. 3:3 15-27.

Scott, I. W.—Occurrence of Red and White Friesians. *Agric. Gaz. N.S.W.* 68: 605-9. *Dairy Topics*. 3:2 8-9.

Scott, I. W.—Semi Official Survey of A.I.S. Sires. *Dairy Topics*. 3:1 14-20.

Silversides, H. E.—A Cheese for Every Taste. *Agric. Gaz. N.S.W.* 69: 163-4.

Small, A. C.—Points of Interest to Valuers and Buyers of Land. *The Land Inspector*.

Small, A. C.—Stage I, Dairy Technology Course. *Technical College Correspondence Course*.

Smith, J. W. G.—Deposits and Overdrafts. *Dairy Topics*. 3:2 11.

Vernon, F. A.—Cheese Heated in Transport, Butter Fat and Solids. 17:1 43.

E. DIVISION OF SCIENCE SERVICES

(i) BIOLOGICAL BRANCH

D. of A. Booklets

Anon.—Black Spot of Apple and Pear. (Revised.) 11 pp., ill.

Anon.—Cymbidium Mosaic. (Revised.) 2 pp.

Anon.—Diseases of Melons, Pumpkins and Related Plants. (Revised.) 11 pp., ill.

Anon.—Diseases of Parsnips. (Revised.) 3 pp., ill.

Anon.—Ergot of Paspalum. (Revised.) 5 pp., ill.

Anon.—Home Orchard Calendar. (Revised.) 28 pp., ill.

Anon.—Leaf Curl of Stone Fruits. (Revised.) 4 pp., ill.

Anon.—Mushroom Culture, 48 pp., ill.

Anon.—Mushroom Culture for Beginners. (Revised.) 9 pp., ill.

Anon.—Myxomyces of Slime Moulds. 1 p., ill.

Anon.—Root Knot or Root Gall. (Revised.) 7 pp., ill.

Anon.—Spotted Wilt and Other Virus Diseases of Tomatoes. (Revised.) 10 pp., ill.

Anon.—Soil Acidity and the Growth of Vegetables. (Reprint.) 5 pp., ill.

Anon.—Zinc Deficiency of Fruit Trees. (Revised.) 7 pp., ill.

Richards, R. J.—Care and Maintenance of Cheese Starter Cultures. 10 pp., ill.

Walker, J.—Further Diseases of Clovers in New South Wales. 7 pp., ill.

Contributions to Journals

Anon.—Armillaria Root Rot of Fruit Trees. *Agric. Gaz. N.S.W.* 69: 87-90.

Anon.—Black Spot of Citrus. *Agric. Gaz. N.S.W.* 69: 156-7.

Anon.—Bunt or Stinking Smut of Wheat. *Agric. Gaz. N.S.W.* 69: 244-5.

Anon.—Common Scab of Potato. *Agric. Gaz. N.S.W.* 68: 471-2.

Anon.—Foliage and Stem Nematodes. *Agric. Gaz. N.S.W.* 69: 157-59.

Anon.—Late Blight of Potatoes. *Agric. Gaz. N.S.W.* 68: 316-9.

Anon.—Need for Crop Rotation. *Agric. Gaz. N.S.W.* 69: 198-9.

Anon.—Poisoning by Toadstools. *Agric. Gaz. N.S.W.* 68: 647-8, 651.

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